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Jakarta, 11-12 August 2023

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Proceedings Pre-Conference of the International Conference Social Determinants of Health 2023 (ICDSH 2023)

"*Healthy Workforce Environment for Enhancing Productivity*"

Jakarta, 11-12 August, 2023

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PREFACE

The 5th International Conference Social Determinants of Health (ICSDH 2023) is a regular International seminar. The 5th ICSDH was held *online* in Jakarta, Indonesia on August 11-12, 2023 University of Muhammadiyah Prof. DR. Hamka with the theme "Healthy Workforce Environment for Enhancing Productivity". The purpose of the conference is to provide a platform for researchers, experts, and practitioners from academia, government, NGOs, research institutions, and industry to discuss and share cutting-edge advances in the fields of public health, pharmacy, psychology, nutrition, and medical science.

We would like to express our gratitude to all participants who have participated in international seminar activities. We also express our gratitude to the organizing committee for the success of this activity so that the proceedings can be published. In the the 5^{th} ICDH, we published two proceedings, Pre-conference Proceeding and Conference Proceeding. In this Pre-conference Proceeding, we collected 26 articles, consist of 2 articles with the theme Behavioural Change Communication and Education, 7 articles with the theme Food Research, 2 with the theme Maternal and Child Health Nutrition, 9 with the theme Adolescent Health and Nutrition, 4 articles with the theme Determinants and Prevention of Non Communicable and Communicable Disease, and 2 aricles with the theme Occupational Health and Safety

Hopefully this proceedings can be a tool to increase knowledge about health issues that occur, and benefit all participants and academics.

Jakarta, Agustus 2023
Dean of Health Sciences Faculty of
Universitas Muhammadiyah Prof. Dr. HAMKA

Ony Linda, M.Kes

Proceedings Pre-Conference of the International Conference Social Determinants of Health 2023 (ICDSH 2023)

"*Healthy Workforce Environment for Enhancing Productivity*"
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EMERGENCY FOODS BASED ON TARO FLOUR, WHITE KEPOK BANANA FLOUR AND MUNG BEANS FLOUR ON ACCEPTABILITY, PROTEIN AND ENERGY CONTENT

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Keywords: Emergency Food, Acceptability, Protein, Energy.

Abstract: Introduction: Disaster event are emergency conditions that require food readiness that is ready for consumption. Emergency food is food that has high energy and nutrients for victims of natural disasters which can be consumed immediately in an emergency. Local food ingredients can be used as emergency food ingredients such as taro and green beans. This study aimed to produce emergency food based on taro flour, white kapok banana flour and mung bean flour which is acceptable with high protein and energy content. Methods: The type of research to be conducted is a true experiment with a randomized block design. The research began with determining the percentage of raw materials used and formulations of taro flour, white kepok banana flour and mung bean flour using Mixture Experiment D Optimal and selecting 3 formulations that met the requirements for energy estimation and nutritional content. The data to be taken is acceptance, protein and energy levels. Acceptance will be tested using the Kruskal Walls test, protein and energy levels using the ANOVA test. Results: The results of emergency food products in food bars have physical properties of light brown color, distinctive aroma of pastries, sweet taste, soft texture. Judging from the acceptability of the panelists, the most preferred emergency food for emergency food B was taro flour : kepok banana flour : mung bean flour = 50% : 25% : 25%. The highest protein content is 9.19%, and energy is 129.07kcal. Conclusion: There is an effect of emergency food variations of taro and mung bean flour on acceptability, protein and energy levels. There is a qualify nutrition on emergency food.

1 INTRODUCTION

The international community has been confronted with an increasing number of manmade and natural humanitarian crises since the end of the Cold War. At an increasing rate the number and severity of emergencies are rising, with more people at risk in ever greater numbers. In the past decade, two billion people have been hit by war and disasters (Clugston, 2014).

One of the countries in which natural disasters are frequent is Indonesia. This is because Indonesia has a convergence of 3 tectonic plates at its geographic location, the IndoAustralian plate at the south, the Eurasian at northern and the Pacific plate at southern. According to data BNPB disasters that occurred as much as 1,567 incidents, 568 missing victims, victims who were displaced as much 2.680.133 (BNPB, 2014). It's contributing to enormous physical damage, injury, loss of life and economic damage. Health care facilities, water and food supplies may suffer serious damage in the event of a disaster. Refugees are in a dilemma as to how to meet their food needs. As a result, there is an increased need to produce emergency food that has been prepared for consumption.

Unpredictable disaster events raise many problems due to the community's unpreparedness in dealing with disasters. These problems are generally related to many aspects or are often termed Complex Emergencies (Tanner, 2001).

In order to meet the needs of refugees, emergency food must be appropriate in terms of nutrition; For emergency food at 2200Kcal a day, calories should be found in accordance with nutrition adequacy score. The total calories total macronutrient recommended

that protein by 10-15%, 35-45% fat and carbohydrates at 40-55%. The moisture is another important thing to keep in mind with emergency food. As a result of the water activity of 0.65 to 0.70, the water content of emergency food should not exceed 10% (Grobler. 2001). Because low water levels are capable of extending the shelf life of food emergencies. To get the location, it takes a long while to distribute emergency foodstuffs so they can last longer.

One food product that can be used as emergency food is a food bar, the food bar is made using a material enriched with nutrient which are formed into compact an hard. Food bar including food resistant to pressure, more resistant than dry food because it is a type for intermediate moisture food this kind of food can be produced by locals food. The locals food can be produced to make a food bar are taro, kepok banana and mung bean.

Nutritional standards shall be complied with in the production of emergency food products. For that reason, the inclusion of fat and carbohydrates must be added in order to satisfy the nutrition standards set out. In almost all regions of Indonesia mung bean and kepok bananas are two types of food having a high protein content and carbohydrates which can easily be found.

Banana is a fruit that is preferred by the citizens of Indonesia. The mung beans are a type of bean that's high in protein. In Indonesia, the production of mung beans as a food source for vegetable proteins can be deemed to constitute an excellent but not yet optimised processing.

Mung bean flour has a high nutritional composition including carbohydrates (56.43 ± 0.16%), fiber (4.95 ± 0.08%) fat (1.53 ± 0.04%), and protein (23.84 ± 0.04%) (Branch, 2017). The nutritional composition includes ash (4.49 ± 0.17%), carbohydrates (73.35 ± 0.47%), fat (3.49 ± 0.29%), and protein (15.10 ± 0.27%) (Sakung and Rahmawati, 2020). Mung beans are a source of vegetable protein. Furthermore, every 100 g contains 323 kcal of energy, 22.9 g of protein (19.5–33.1%), 1.5 g of fat, 56.8 g of carbohydrates. In this study will be examined further on comparison of the use of taro flour, kapok bananas and mung bean acceptability, protein and energy content of emergency food in the form of food bar.

2 MATERIALS AND METHODS

The type of research to be conducted is a true experiment with a randomized block design. The research began with determining the percentage of raw materials used and formulations of taro flour, white kepok banana flour and mung bean flour using Mixture Experiment D Optimal. aiming to find out the descriptive of the acceptability, protein and energy content of food bar from taro flour, white kepok banana flour and mung bean flour. This research was used 3 variations of the treatment. the treatment was about the comparison of the use taro flour : kapok bananas flour : mung bean with ratios of food bars A 50% : 30% : 20%, food bars B 50% : 25% : 25% and food bars C 50% : 35% : 15%. The ingredients each treatment in the production of food bar can be seen in Tabel 1.

The research was conducted in several stages. The first step is the determination of the formulation of food bars from taro, kepok bananas, and mung bean predicting the adequacy of nutrition of each formula. The second is the analysis of protein (Kjedhal extraction), calorie (by calculation), and hedonic sensory test in terms of color, taste, aroma, and texture.

The data to be taken is acceptance, protein and energy levels. Acceptance will be tested using the Kruskal Walls test, protein and energy levels using the ANOVA test.

Table 1: Emergency food formulation based on taro flour, kapok banana flour and mung bean flour.

Ingredients	Formula (%)		
	Food bars A	Food bars B	Food bars C
Taro flour	50	50	50
Kepok Bananas flour	30	25	35
Mung bean flour	20	25	15
Margarine	25	25	25

Full cream milk powder	10	10	10
Sugar	25	25	25
Egg	20	20	20

3 RESULTS AND DISCUSSION

3.1 Acceptability

The acceptance test for the three food bars with different compositions of taro flour, kapok bananas flour and mung bean flour showed almost the same results in every aspect of the assessment, with the lowest score of 6.20 indicating a “moderately favorable” criterion for the mung bean taste, and the highest score 7.84 indicating a “very favorable” criterion for the crunchy texture.

The results of statistical tests showed that there was a significant difference in the acceptability of food bars with taro flour, kapok bananas and mung bean flour on the overall indicators, color, aroma, taste and texture. The result of statistic with Kruskal Wallis (table 2).

Table 2: The assessment results of the food bars acceptance test

Formulation	Acceptability Attribute			
	Color	Aroma	Taste	Texture
Food bars A	5.00[b]	4.96[b]	5.28[a]	4.88[a]
Food bars B	4.60[a]	4.32[a]	4.00[b]	4.08[b]
Food bars C	5.08[b]	4.92[b]	5.08[a]	5.24[c]
p value	0.016	0.033	0.000	0.000

Overall, the food bars B achieved the highest food bars acceptability. The different composition of the two types of flour gave a balance to the attributes of color, aroma, texture and taste of the food bars. The aroma and taste of taro flour were dominant, reduced by the use of more kapok bananas and mung bean flour.

Aroma, texture, color, taste caused by the content of the main ingredient, banana flour can affect the aroma, color, and texture that is caused by sugar content or the starch of the banana flour. Also, the mung bean flour can affect aroma and flavor and texture as it contains fat. Besides, special aroma form mung bean also affects the food bar’s aroma (Suhartomo, 2011). The aroma is a very subjective taste and smell and difficult to measure because each person has a different sensitivity and likeness. Although they're able to detect it, each individual has their own preferences (Avianty, 2013). The substitution of mung bean flour on taro flour food bars gave a difference in the taste attributes.

The color of food bars is yellow brown. There is also a slightly brown color on food bars caused by the Maillard reaction. This Maillard reaction is formed due to the addition of banana flour which causes an enzymatic reaction by the polyphenol oxidation, the nonenzymatic reaction is the This is the maillard reaction of white kapok banana flour and it basically contains an amino acid lysine. Lysine amino acids are formed from two amen groups that react to the reduction of sugars and produce a brown color in the food bars (Avianty, 2013).

The texture is a sensation of pressure that can be seen with the mouth, when bitten, chewed and swallowed or palpated by fingers. In this study, conducted by texture observation sensory texture determination by touching with a finger (Kartika et al, 1988).

3.2 Protein Content

Protein containing compounds C, H, O, and N. The nitrogen content of the protein must be stored in carbohydrates or fat. There's a part of the macromolecule in your body that needs protein. Proteins are one of the most important substances in our bodies. The protein contains amino acids in essentially complete form. It is possible to retain growth and tissue in the body with a complete amino acid.

Table 3: Results of the analysis of protein content in various treatments of the food bars.

Formulation	Protein content
Food bars A Food bars B Food bars C	8.13[a] 8.65[b] 9.19[c]
p value	0,000

The result of the analysis of protein content it is known that food bars C has the highest protein content 9.19% and lowest protein content is food bar C 8.13%. Based on the result of One Way ANOVA test, there was an effect of substitution of taro flour, white kepok bananas flour and mung bean flour on the protein content of the food bars. The results have shown ($p < 0.05$) that there is comparison the protein content of 9,19 % was actually affected by taro flour, white kepok banana flour and mung bean flour. Food bars products produced, so we performed a further test (Mann Whitney).

The protein content of the materials used and the use of egg white may have affected this.

3.3 Energy Content

When you eat food or drink, a calorie is the unit used for measuring how much energy your body has gained from it. The nutrient content of foods such as carbohydrates proteins and fats may be used to determine the food's calories. In order to treat a number of snack bars, the method used for calculating calories is shown in table 5.

Table 4: Results of the analysis of energy content in various treatments of the food bars.

Formulation	Energy content (cal)
Food bars A Food bars B Food bars C	127.46[a] 127.31[a] 129.07[b]
p value	0,016

Results from the analysis of variance ($p<0.05$) have shown that the 5% level of white kapok banana flour was significantly affected by comparison with mung bean flour. The total number of energy content in food bars products produced. A higher value of the products energy content food bars are attributed to increased use of taro flour and kepok banana flour. This is because of the nutritional components that affect each treatment, where treatment 50% : 30% : 20% has a value of fat and carbohydrates were higher compared with the treatment of 50% : 35% : 15% and 50% : 30% : 20%. Energy content is obtained from the conversion of proteins, fats, and carbohydrates into energy. The energy required to fuel a gram of fat is 9 kcal, while carbohydrates provide 4 kcal. The energy of 4 kcal per g is generated by carbohydrate and protein (Gabrina, 2016).

4 CONCLUSIONS

There is an effect of emergency food variations of taro and mung bean flour on acceptability, protein and energy levels. There is a qualify nutrition on emergency food.

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ASSOCIATION BETWEEN SMOKING BEHAVIOR AND HIGH-FAT DIET WITH THE INCIDENCE OF HEART DISEASE AMONG THE ELDERLY IN INDONESIA (ANALYSIS OF RISKESDAS 2018)

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Keywords: Elderly, Heart Disease, High-Fat Diet, Riskesdas 2018, Smoking Behavior

Abstract: Cardiovascular disease is a heart disorder and the leading cause of death. Based on Riskesdas 2018, Indonesia's heart disease case is most widely found in the elderly population, with the highest prevalence at the age of 65-74 years old (4.6%). For those aged 75 and above, the prevalence of heart disease reaches 4.7%. This study aims to determine the relationship between smoking behavior and high-fat foods consumption with the incidence of heart disease among the elderly in Indonesia based on Riskesdas 2018 data analysis. This study is a quantitative research with a cross-sectional design and uses bivariate analysis with the chi-square test. The sample size for this study is 91.936. This study shows a relationship between smoking behavior (p = 0,000), high-fat food consumption (p = 0,000), and nutritional status with heart disease among the elderly (p = 0,000). Meanwhile, there is no relationship between age and gender with the incidence of heart disease among the elderly with p-values of 0,167 and 0,585 (p > 0,05). This study concludes that there is a relationship between smoking behavior and consumption of high-fat foods with the incidence of heart disease among the elderly in Indonesia.

1 INTRODUCTION

Cardiovascular disease is a leading cause of death worldwide. Every year, an estimated 17.9 million lives are reported to be lost, accounting for approximately 32% of global deaths (World Health Organization 2019) The World Health Statistics Report WHO states that in 2019, Indonesia had a 24.8% probability of premature death (between ages 30-70) due to cardiovascular disease (World Health Statistics 2022).

Cases of heart disease in Indonesia are most prevalent among the elderly population, with the highest prevalence occurring in the age group of 65-74 years at 4.6%, and those aged 75 and above having a plurality of 4.7%. Nationally, the prevalence of heart disease is 1.5%, compared to 0.5% in 2013 (Kementerian Kesehatan 2019). According to Susenas data from March 2022, the elderly population in Indonesia has increased by 10.48%. This trend of aging is expected to continue until 2050, with a projected global elderly population of 426 million (Badan Pusat Statistik 2022).

Heart disease can be caused by two factors: non-modifiable factors such as age, family genetics, gender, and post-menopausal status, and modifiable factors including smoking, hypercholesterolemia, and poor dietary habits (Frans Santosa and Strodter Dietrich 2016). Based on available data, Indonesia has been selected as the country with the highest smoking population in the world, reaching 66% among adult males and 41% among adolescents aged 13-15 (Tan Yen Lian and Ulysses Dorotheo 2018). Each year, there is an increase in the number of new smokers aged 10-19 years, amounting to 16.4 million, with 45,000 children under the age of 19 starting to smoke every day. According to the World Health Statistics report (2022), the prevalence of smoking in Indonesia is 37.6%, which is higher compared to

other Southeast Asian countries (World Health Statistics 2022).

As age increases, the prevalence of smoking decreases however, it is interesting to note that among the elderly population over 80 years old, the prevalence of smoking remains high at 13.87% (Badan Pusat Statistik 2022), while the age group with the highest prevalence of smoking is 60-69 years old at 25.7% (Kementerian Kesehatan 2019). Research conducted by Karyatin (2019) has shown a significant relationship between smoking and coronary heart disease, with a p-value of 0.045 at Sumber Waras Hospital (Karyatin 2019). Another study by Agustanti (2015) has also demonstrated a significant correlation between smoking habits and the risk of heart failure compared to non-smokers (Agustanti 2015).

Another factor that can cause heart disease is dietary habits. Poor food choices can have an impact on overall health, particularly frequent consumption of high-fat foods. High fat intake can lead to the deposition of fats and cholesterol in the body (Marlinda, Dafriani, and Irman 2020). Specifically, unsaturated fatty acids can affect the increase of LDL cholesterol levels in the body, making it easier for blood to form clots and damage artery walls, resulting in narrowed blood flow to the heart (Khazanah et al. 2019).

The prevalence of high-fat dietary habits in Indonesia remains high, with 45% of people consuming high-fat foods 1-6 times per week. Among the elderly, the prevalence of high-fat dietary habits for the age group of 60-64 years is 39.6% for ≥1 time per day, 42.7% for 1-6 times per week, and 21.1% for ≤3 times per month for those above 65 years (Kementerian Kesehatan 2019). Research conducted by Pabela (2019) found that 94.6% of patients with coronary heart disease at RSUD M. Yunus frequently consumed high-fat foods (Pabela, Krisnasary, and Haya 2019). This finding is consistent with the results of Khazanah (2019), which showed a 56.9% association between high-fat food consumption and coronary heart disease (Khazanah et al. 2019). Unlike the findings of Iskandar's study (2017) which found no correlation between high-fat food consumption and the incidence of coronary heart disease, only about 6.7% of the total respondents experienced coronary heart disease due to frequent high-fat food consumption (Iskandar, Hadi, and Alfridsyah 2017).

Therefore, the heterogeneity of the results of previous studies is interesting for the author to examine more deeply the relationship between smoking behavior and fatty food habits with the incidence of heart disease in the elderly in Indonesia because there has been no research linking these variables at the national level. The purpose of this study was to determine the relationship between smoking behavior and consumption of fatty foods with the incidence of heart disease in the elderly in Indonesia based on the analysis of Riskesdas 2018 data, and it is hoped that through this study it can increase knowledge and increase public awareness to start living good and healthy habits so that they can avoid the incidence of heart disease.

2 METHOD

This research is a quantitative study with a cross-sectional design. This study aims to identify the relationship between the independent variables, namely smoking behavior and high-fat food consumption, with the dependent variable, which is the incidence of heart disease in the elderly in Indonesia. The data for this research is based on the secondary analysis of the Riset Kesehatan Dasar (Riskesdas) in 2018. However, the study itself was conducted from January to June 2023, using data collected through interviews in 34 provinces in Indonesia by the Badan Penelitian dan Pengembangan Kesehatan.

The population for this study consists of individuals aged 60 years and above in Indonesia in 2018, and the sample size used was 91.936. The inclusion criteria were individuals aged 60 years and above, while the exclusion criteria included individuals with incomplete data for both independent and dependent variables (less than 100%) and those with extreme nutritional status (BMI < 12 kg/m2 or > 60 kg/m2) (CDC 2023).

The research instruments used were individual questionnaires and household questionnaires from the 2018 Riskesdas interview. Bivariate analysis using chi-square was employed to determine the relationship between the two independent and dependent variables. This research has obtained ethical approval from the Research Ethics Committee of Universitas Pembangunan Nasional "Veteran" Jakarta with the number 186/V/2023/KEPK.

3 RESULTS AND DISCUSSION

3.1 Overview Frequencies Variabels

Table 1: Overview Frequencies Variabels

Variabel	n	%
Age		
60 – 64	35.952	39,1
65 – 74	39.105	42,5
≥75	16.879	18,4
Gender		
Male	47.848	52,0
Female	44.088	48,0
Nutrirional Status		
Underweight	16.063	17,5
Normal	52.528	57,1
Overweight	9.973	10,8
Obesity	13.372	14,5
Starting Age of Daily Smoking		
≤18 year	6.707	26,6
≥18 year	18.483	73,4
Age of First Smoking		
≤18 year	12.053	49,2
≥18 year	12,455	50,8
Type of Cigarette Smoked		
Clove cigarettes	24.441	54,7
White cigarette	8.605	19,2
Rolled cigarettes	11.503	25,7
Electric	103	0,2
Shisha	98	0,2
Smoking Behavior		
Yes, every day	25.190	27,4
Yes, not every day	8.401	9,1
Never smoked	58.345	63,5
High-fat Diet		
>1 time per day	28.985	31,5
1-6 times per week	41.316	44,9
<3 times per month	21.635	23,5
Heart Disease		
Yes	3.922	4,3
No	88.014	95,7

Table 1 describes the characteristics of respondents based on age, gender, nutritional status, age of starting smoking daily, age of first-time smoking, type of commonly smoked cigarettes, smoking behavior, high-fat food consumption, and heart disease. From the analysis, it can be concluded that the majority of the sample falls within the age range of 65-74 years, totaling 39,105 samples (42.5%). The majority of the participants in this study are male, with a total of 47,848 samples (52%). The most common nutritional status in this study is underweight, with 16,063 samples (17.5%), followed by obesity with 13,371 samples (14.5%).

Regarding the characteristic of age when starting to smoke daily, the results show that 18,483 samples (73.4%) reported starting smoking daily at the age of ≥18 years, with the most prevalent age being 20 years at 3.5%. On the other hand, for the characteristic of age when starting to smoke for the first time, the majority of the samples started smoking at ≤18 years of age, totaling 12,053 samples (49.2%). The most commonly smoked type of cigarette in this study is kretek cigarettes, accounting for 24,441 samples (54.7%), followed by rolled cigarettes at 11,503 samples (25.7%).

The analysis of smoking behavior reveals that 58,345 samples (63.5%) claimed to have never smoked, while 25,190 samples (27.4%) reported smoking daily. Regarding high-fat food consumption, 41,316 samples (44.9%) reported consuming high-fat foods 1-6 times a week. Lastly, the analysis of heart disease shows that 3,922 samples (4.3%) have been diagnosed with heart disease by a doctor or other healthcare professionals.

3.2 Average of Cigarettes Smoked

Table 2 : Average of Cigarettes Smoked

Ciggarette Consumption	**Median (Stems)**	**Min.**	**Max.**	**n**
Stem/day	12,00	1	32	24.529
Stem/week	7,00	1	36	8.154

Table 2 describes the results of the analysis of sample characteristics based on the average number of cigarettes smoked, and the results obtained that the elderly spend 12 cigarettes per day and 7 cigarettes per week.

Based on Sitepoe (2000), individuals who smoke 1-10 cigarettes per day are classified as light smokers, those who smoke 11-24 cigarettes per day are categorized as moderate smokers, and those who smoke more than 24 cigarettes per day are considered heavy smokers (Mangku Sitepoe et al., 2000). Previous research conducted by Hackshaw et al. (2018) in a population aged 45 years, 55 years, and 65 years showed that men who consumed more than 20 cigarettes per day (heavy smokers) had a 2.04 times higher risk of developing heart disease compared to those who smoked 1 cigarette per day (light smokers). On the other hand, in women who were heavy smokers, the risk of heart disease was 2.84 times higher compared to women who were light smokers (Hackshaw et al. 2018).

3.3 Relationship Between Respondents' Characteristics and Heart Disease

Tabel 3 : Relationship Between Respondents' Characteristics and Heart Disease

Variabel	**Heart Disease**				**Total**		***P-value***
	Yes	**%**	**No**	**%**	**n**	**%**	
Age							

Variabel	Heart Disease				Total		*P-value*
	Yes	**%**	**No**	**%**	**n**	**%**	
60 – 64	1.483	4,1	34.469	95,9	35.952	100	0,167
65 – 74	1.722	4,4	37.383	95,6	39.105	100	
≥75	717	4,2	16.162	95,8	16.879	100	
Gender							0,585
Man	2.024	4,2	45.824	95,8	47.848	100	
Women	1.898	4,3	42.190	95,7	44.088	100	
Nutritional Status							0,000
Underweight	490	3,1	15.573	96,9	16.063	100	
Normal	1.926	3,7	50.602	96,3	52.528	100	
Overweight	554	5,6	9.419	94,4	9.973	100	
Obesity	952	7,1	12.420	92,9	13.372	100	
Total	**3.922**	**4,3**	**88.014**	**95,7**	**91.936**	**100**	

Table 3 shows the results of bivariate analysis of the relationship between respondent characteristics and the incidence of heart disease. The statistical test results for age yielded a p-value of 0.167 (p > 0.05), indicating that there is no significant relationship between age and the incidence of heart disease in the elderly. The results of this study are similar to research conducted by Hinonaung (2018) where the p-value is 0.519 (p> 0.05) meaning that there is no significant relationship between age and the incidence of coronary heart disease (Hinonaung et al. 2018). It is essential to note that these differences may not be significant because this study only compares the older age group without comparing it to a younger age group. Just like the study conducted by Arisandi (2022) that investigated individuals aged ≤40 years and ≥40 years, which demonstrated a relationship between age and coronary heart disease in the age group ≥40 years with a p-value of 0.002 (p < 0.05) (Arisandi and Hartati 2022).

Similarly, the analysis of gender found a p-value of 0.585 (p > 0.05), indicating no significant relationship between gender and the incidence of heart disease in the elderly. Other studies also showed the same thing where there was no relationship between gender and coronary heart disease with a p-value of 1,000 (p> 0.05) (Johanis, Tedju Hinga, and Sir 2020). This study shows that there is no association between gender and heart disease, as both male and female individuals aged ≥60 years have similar risk levels, with a percentageof 4.2% for males and 4.3% for females. Therefore, the risk of developing heart disease can occur in both males and females.

The elderly is characterized by a decline in heart function, as well as a reduction in the elasticity of blood vessels that allows them to expand and contract according to blood flow. Consequently, blood pressure increases, burdening the heart's work and increasing the likelihood of heart failure (Strait and Lakatta 2012). In addition can also increase the production of oxidative stress, where there is an excess of free radicals that reduces the ability of antioxidants to neutralize them. The increased production of reactive oxygen species (ROS) can lead to the development of heart disease, as ROS damages endothelial cells, leading to inflammation and lipid oxidation, triggering atherosclerosis due to artery narrowing and reduced blood flow, which can result in a heart attack (Rodgers et al. 2019). Elderly conditions are also one of the factors of women experiencing menopause, based on existing theories women of childbearing age have a lower chance of heart disease due to the beneficial role of estrogen, where the estrogen hormone that women have can increase HDL levels and reduce LDL levels in the blood so that HDL can transport cholesterol from the arteries to the liver and avoid the accumulation of atherosclerosis plaque. Estrogen also has antioxidant properties and can protect endothelial cells from oxidative stress damage (Aaronson I. and Ward T. P. 2010; Gao et al. 2019).

The analysis results for nutritional status based on the statistical test conducted showed a p-value of 0.000 (p < 0.05), indicating that there is a significant relationship between nutritional status and the incidence of heart disease in the elderly. The results align with Laksmi's (2019) study, which also demonstrated a link between nutritional status and heart failure. The research indicates that poor nutrition can have a significant impact on patients with congestive heart failure, potentially increasing their risk of mortality. The p-value was found to be 0.043 (p < 0.05) (Laksmi and Putra 2019).

Obesity is also associated with an increase in blood pressure, cholesterol, and glucose levels, which can lead to atherosclerosis (Rodgers et al. 2019). Higher accumulation of visceral fat (fat around internal organs) is a condition that can contribute to increased LDL levels in the blood, leading to plaque buildup in the coronary arteries. Endothelial cell dysfunction in individuals with obesity is caused by the reduced availability of nitric oxide, which regulates inflammation and neutralizes oxidative

stress, making the process conducive to atherosclerosis (Powell-Wiley et al. 2021).

3.4 Relationship Between Smoking Behavior and Heart Disease

Tabel 4 : Relationship Between Smoking Behavior and Heart Disease

Variabel	Heart Disease				Total		*P-value*
	Yes	%	No	%	n	%	
Smoking Behavior							
Yes, every day	860	3,4	24.330	96.6	25.190	100	0,000
Yes, not every day	493	5,9	7.908	94,1	8.401	100	
Never smoked	2.569	4,4	55.776	95,6	58.345	100	
Total	3.922	4,3	88.014	95,7	91.936	100	
Age of First Smoking							
≤18 year	1.219	4,2	27.766	95,8	28,985	100	0,194
≥18 year	1.646	4,0	39.670	96,0	41.316	100	
Total	1.059	4,3	23.449	95,7	24.508	100	
Type of Cigarette Smoked							
Clove cigarettes	1.030	4,2	23.411	95,8	24.441	100	0,005
White cigarette	397	4,6	8.208	95,4	8.605	100	0,002
Rolled cigarettes	362	3,1	11.141	96,9	11.503	100	0,000
Electric	8	7,8	95	92,2	103	100	0,071
Shisha	5	5,1	93	94,9	98	100	0,600
Total	1.353	4,0	32.238	96,0	33.591	100	

Table 4 shows the results of bivariate analysis on the relationship between smoking behavior and the incidence of heart disease, and the statistical test conducted obtained a p-value of 0.000 ($p < 0.05$), indicating that there is a significant association between smoking behavior and the incidence of heart disease in the elderly. Previous research conducted by Pracilia (2018) by proving the relationship between smoking and the incidence of coronary heart disease where the results of p-value 0.000 ($p < 0.05$) (Pracilia and Nelwan 2018).

Another aspect of smoking behavior in the elderly is the age of first smoking, and the statistical test resulted in a p-value of 0.194 ($p > 0.05$), indicating no significant relationship between the age of first smoking and heart disease. This study is similar to research conducted by Lubin (2016), which shows that there is no relationship between the age of first smoking and heart disease, with a p-value of 0.69 ($p>0.05$) (Lubin et al. 2016). The results of this study do not provide evidence of a relationship because the percentage of individuals experiencing heart disease is not significantly different between those who started smoking at ≤18 years of age and those who started at ≥18 years of age. Therefore, in the elderly population, both those who started smoking at ≤18 years and those who started at ≥18 years have the same level of risk for heart disease.

However, the statistical test for the type of cigarettes usually smoked in relation to heart disease obtained a p-value < 0.05 there is a significant relationship between the type of cigarettes usually smoked and heart disease. The research conducted by Afriyanti (2015) states a similar finding, where both kretek (clove) cigarettes and white cigarettes are associated with heart disease, with a p-value of 0.001 ($p < 0.05$) (Afriyanti, Pangemanan, and Palar 2015).

Cigarette smoke is known to contain harmful chemicals, including nicotine, tar, benzene compounds, cadmium, ammonia, carbon monoxide, arsenic, and hydrogen cyanide. These chemicals can damage the blood vessel lining, known as the endothelium, and cause oxidative stress, leading to inflammation and chronic diseases like heart disease. Studies have shown the negative impact of cigarette smoke on our health (Gallucci et al. 2020).

Cigarettes contain hazardous substances that can contribute to the development of atherosclerosis in the heart, for example, nicotine and tar can increase oxidative stress, leading to the damage of endothelial cells in the body, disrupting blood flow, and blood pressure. Disturbance in endothelial function causes a decrease in nitric oxide (NO) production, which plays a role in helping to maintain blood vessels in a relaxed state, affecting vessel dilation, and increasing blood clotting factor production. Carbon monoxide found in cigarettes can also bind to hemoglobin in the blood more strongly than oxygen, reducing the blood's ability to transport oxygen to body tissues. As a result, the heart experiences oxygen deficiency and increases the risk of heart disease (Gallucci et al. 2020; Keto et al. 2016).

3.5 Relationship Between High-Fat Diet Consumption and Heart Disease

Tabel 5 : Relationship Between High-Fat Diet Consumption and Heart Disease

Frequency of High-Fat Diet Consumption	Heart Disease				Total		*P-value*
	Yes	%	No	%	n	%	
>1 time per day	1.219	4,2	27.766	95,8	28,985	100	0,000
1-6 times per week	1.646	4,0	39.670	96,0	41.316	100	

Frequency of High-Fat Diet Consumption	Heart Disease				Total		*P-value*
	Yes	%	No	%	n	%	
<3 times per month	1.057	4,9	20.578	95,1	21.635	100	
Total	3.922	4,3	88.014	95,7	91.936	100	

Table 5 shows the results of bivariate analysis on the relationship between high-fat food consumption and the incidence of heart disease, and the statistical test conducted obtained a p-value of 0.000 ($p < 0.05$). The research conducted by Khazanah (2019) also demonstrated similar findings, where the statistical test resulted in a p-value of 0.000 ($p < 0.05$), indicating a significant relationship between fat consumption and the incidence of heart disease (Khazanah et al. 2019).

Further analysis indicates the samples who exhibited smoking behavior were also found to consume high-fat food 1-6 times a week, comprising 580 samples (3.8%), and 389 samples (3.45%) of smokers who also consumed high-fat food more than once a day. Smoking behavior and high-fat food consumption, when done together and repeatedly, have a cumulative and harmful impact on the heart, as they can damage endothelial cells, leading to an imbalance in oxidant levels within these cells. The subsequent process involves the oxidation of LDL, which becomes atherogenic and chemotactic. The chemotactic property can lead to circulating monocytes penetrating the endothelial monolayer and accumulating to be ingested by macrophages. Continuous accumulation of these cells can lead to foam cell formation, eventually forming plaques and initiating the process of atherosclerosis (Aaronson I. and Ward T. P. 2010).

4 CONCLUSIONS

In this study, the characteristics that have a relationship with heart disease in the elderly are nutritional status with statistical test results p - value 0.00 ($p < 0.05$). Smoking behavior with the incidence of heart disease in the elderly has a significant relationship where the statistical test results p - value 0.000 ($p < 0.05$). Fatty food consumption with the incidence of heart disease in the elderly has a significant relationship where the statistical test results p - value 0.000 ($p < 0.05$).

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A Scoping Review: Effect Operational Conditions on Driver Fatigue Causes Multiple Accidents in Public Transportation Bus at Jakarta

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Keywords: Bus Driving, Drivers, Fatigue, Operational conditions, Public Transportation

Abstract: This reviews study examined driver fatigue. Bus drivers reported fatigue as most commonly occurring in the early hours of the morning. When it did occur, most bus drivers reported that fatigue adversely affected their driving performance in highly specific ways, namely, making them slower to react, poorer in gear changing and poorer in their level of attention to other traffic and traffic signs. These performance effects are most likely to be the mechanism for role of fatigue causes multiple accidents. One of the major impediments to better management of driver fatigue in the bus transportation industry has been a lack of practical assessment of nature in the problem industry as it operates. This has been especially true of assessment operational influences in relation to driver fatigue. This has adapted bus transportation sector obtained information about the drivers' experience fatigue, working conditions, type driving operation as well as details of their last trip and last working week. The results revealed that the experience of drivers in the public transportation sector only partially overlapped that of the bus transportation sector. There was major divergence, however, in the ways drivers reported managing fatigue relevance to industry. The impact of current operational conditions on driver fatigue has important implications for establishing priorities for improving management problem.

1 INTRODUCTION

Public transportation traffic is the major problem for metropolitan cities such as Jakarta. The increasing number of vehicles passing by each time, both cars, motorcycles, and public transportation have an impact on street density in the capital resulting in multiple accidents. The world death records issued by World Health Organization (WHO) show that road traffic crashes cause over 1.2 million deaths annually (Sauerzapf et al, 2012). Therefore, the government of DKI Jakarta provided an alternative transportation system. The province government of DKI Jakarta gave the alternative solution for avoiding multiple accidents and reducing private cars with public transportation. The public transportation industry has been lacking in practical assessment of the nature of the problem in the industry as it operates. The present paper reports on the results of the survey of bus drivers and draws comparisons between the two sectors. Even though many situations in driving involve more than one road user and interaction between those road users, most driving models utilize a single driver perspective. Collisions between cars constitute a significant part of the total number of crashes each year. A consequence is that driver modeling should move beyond single driver behavior and aim at explaining interaction between drivers. However, the other problem occurred with how to inform bus route, because the route consisted of corridors and the passengers could not memorize all routes. In previous research, there was research to spread the information of location based on mobile phone that allows to determine the location. Refer to website information used J2ME, which supported all devices. However, the application only provided simple information without a site map. Another research provided site information based on mobile although the application took a lot of memory, which caused some errors or stack.

2 MANUSCRIPT PREPARATION

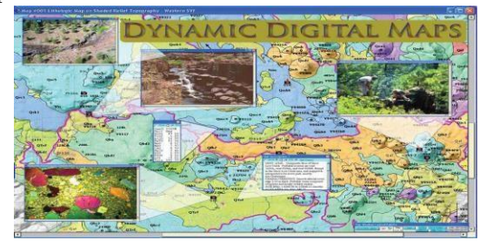
2.1 Present condition

When drivers had more flexibility, they were more likely to take their rest breaks to coincide with periods of fatigue and to avoid starting their trips in the early hours of the morning. Drivers who did not have such flexibility but did shorter trips also appeared to fare better than drivers who had neither flexibility nor shorter working hours. These findings underscored that operational factors other than working hours are also important in determining the experience of fatigue among bus drivers.

Lack of media informed bus route, even the information only provided in each bulletin board but still often confusing. Therefore, drivers and passengers needed an information service that could give information of bus routes in multimedia and mobile technology. The application provided information of bus routes and tested by fifty passengers. The result indicated that 94% of passengers were satisfied, understood the route, and no error when running the application. The purpose is to suggest a basic model to help explain coordination in traffic to avoid multiple accidents.

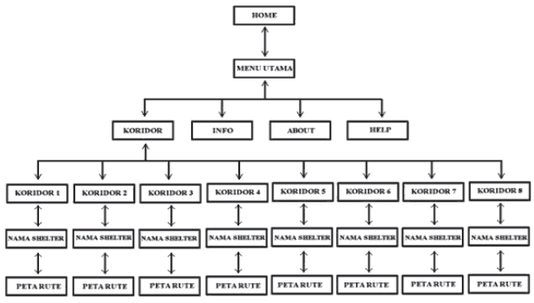
2.2 Map Digital

Map is a graphic representation of the spatial relationships of entities within an area. Maps are maintained in a computer readable electronic format that can be displayed to a computer screen and plotted on paper with the appropriate software. Therefore, the researchers proposed an application providing bus routes for drivers and passengers and could access in mobile phones, which supported by the mobile application.



1. Digital Map [6]

Figure 2. Navigation Structure Figure



2.3 State The Art

Cognitive Systems Engineering (CSE) (Hollnagel & Woods, 1983; 2005) is an approach that aims at analyzing and evaluating the performance of complex systems consisting of both humans and technical artefacts. Taking a stance in cybernetics, CSE has extended the basic cybernetic theories about control by taking cognitive aspects into account. A basic premise in CSE is that all humans act in a socio-technical context that primarily shapes their behaviors, and thus performance. According to Cognitive Systems Engineering it is possible to view a person and the equipment he or she use as a Joint Cognitive System (JCS), meaning that the system strives toward a goal and that the system can modify its behavioral pattern based on experience to achieve anti-entropic ends. How can then the boundaries of a JCS be defined? (Hollnagel & Woods, 2005) use the following example: a driver and his/her car is a JCS, but a driver, his/her car and other drivers and their cars on a road are also a JCS, although on a different analytical level. To define if a constituent should be a part of the JCS, it is firstly necessary to identify if the function of it is important for the system, i.e., if the constituent represents a significant source of variety for the JCS – either the variety to be controlled or the variety of the controller (Hollnagel & Woods, 2005). The variety of the controller refers to constituents that allow the controller to exercise his/her variety, thus different kinds of mediators. Secondly, it is necessary to know if the system can manipulate the constituent, or its input, so the result is a specific outcome. If not, the constituent should be seen as a part of the environment. In the case of driving, Hollnagel & Woods states that weather clearly is a part of the environment rather than the JCS, since it is beyond the control of the driver-vehicle system. The driver-vehicle JCS can only modify its behaviors so that it adapts to the weather conditions, it cannot modify the weather.

2.4 The Extended Control Model

Although compensatory (feedback driven) control models apply in many situations, we know that there are great differences in driving style and performance, even when all aspects of the current situation are identical. (Hollnagel et al. 2003) have suggested an extension of COCOM, aiming at describing driving control with even higher levels of control, the Extended Control Model (ECOM). The ECOM does not only try to explain the closed loop behaviors, but also tries to introduce high-level cognitive activities like planning. By providing more specific purposes with the driving activity, we may be able to understand why drivers perform different actions in seemingly similar situations. In the ECOM, control is seen as several parallel activities that give input to each other, see figure 3. Higher level cognitive processes, such as goal setting, will thus affect the lower-level cognitive processes.

The levels of ECOM applied to driving3 could be summarized as follows:

1) Targeting At the targeting level, the driver's own expectations of what will happen in the future derive plans and goals, like, for instance, reaching destinations. Short- and long-term goals are set up and prioritized, which affects lower levels.
2) Monitoring At the monitoring level, the system keeps track of the traffic environment and the vehicle and makes plans both from feedback from lower levels and expectations from the higher level. The plans generated are used by the regulating and tracking loops.
3) Regulating At the regulating level, tasks like target speed, specific position, and movement relative to other traffic elements are controlled, often involving several tracking sub-loops.

4) Tracking At the tracking level, feedback tasks controlled by higher levels' goals and targets are performed, e.g., keeping the car on the road and shifting gears, maintaining speed, distance to the car in front/behind, and relative or absolute lateral position. By an experienced driver, these actions are performed almost automatically.

From the perspective of ECOM, goal properties, like going from A to B as fast as possible, will serve as a gain directly to the lower control level, affecting the overall behaviors of the Joint Driver Vehicle System. However, goals will always be weighed against each other. For example, fast against safety or speed against accuracy. As noted by (Hollnagel et al. 2003), situations may also occur where the driver deliberately gives up control on one or more cognitive levels, to handle more severe difficulties on other. Depending on the more intricate characteristics of the driver, we may find the weighting between goals different.

In this review paper, ECOM is seen as a state-of-the-art model of driving behavior though the model does not only aim at explaining feedback driven behaviors, but also anticipatory, feedforward driven control. This is a significant contribution to driver modelling since it explains the variance in performance due to higher level cognitive activities, which is not explained by the basic feedback-driven models.

2.5 Coordination Professional Drivers

The field of driver modeling aims at explaining the performance of drivers. Many models of vehicle driving are based on either cybernetics/control theory, cognitive psychology as information processing or a mix thereof. To explain how control1 can be achieved in a driving situation has been the major purpose of driver models (Gibson & Crook, 1938). What all these models share is that they approach the task of driving from a single driver's perspective or in some cases the driver and the vehicle as a system. Crashes with more than one driver involved constitute a significant part of all crashes each year, but as the current models work very well as a point of departure, they are insufficient per se to explain the dynamics of driver-driver interaction.

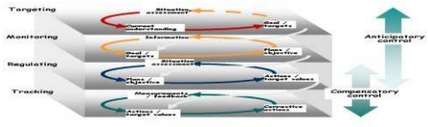


Figure 3. The Extended Control Model (ECOM) (Hollnagel et al., 2003)

A drawback of almost all models based on the cybernetic approach (ECOM included) is that they apply a single driver perspective. Any skilled driver recognizes, however, that a driver's behavior is also shaped by dynamic contextual features, i.e., by interaction with other drivers. The ECOM helps us explain driver behaviors on the levels of goal setting (targeting/ monitoring) and maneuvering (regulating/ tracking), but in its current form, it does not really provide an answer to how drivers coordinate their driving in traffic situations with multiple drivers. For example, when two drivers approach each other in a traffic situation, both will make a rapid assessment of the other driver's intention, and, if necessary, modify their behaviors. (Wilde et al, 1976) states that crucial concepts in the pattern of social interaction in driving are communication and perception of intent, both severely constrained by the design of vehicular signaling systems. The highly structured traffic environment adds more constraints, both in design and by traffic rules and 'social' norms of driving. These constraints help drivers to coordinate their actions, despite the limitations of the communication facilities in automobiles.

The ECOM is a useful conceptual model, or a 'skeleton' of driver-vehicle systems, upon which other theories can be connected to the different levels of control. The compensatory control levels (regulating, tracking) have already been described in detail (Gibson & Crook et al, 1938), but the anticipatory control levels, especially when it concerns how monitoring is shaped by driver assumptions about other drivers and the general traffic situation, has been given less attention. We will suggest such a model, based on Clark's work on joint activities (1996) that can expand the scope of the ECOM and help describe how coordination is achieved between drivers.

3 Materials and methods

3.1 Protocol and Registration

Scoping this review follows Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) guidelines with ISSN number 20085842 (Faramarz et al., 2015) and (Katherine et al., 2022)

3.2 Information Sources and Data Search Strategies

This scoping review was conducted using an online electronic search engine from the following 5 databases: 1) Pubmed; 2) Google Scholars; 3) Elsevier; 4) Cambridge University Press; and 5) Garuda Portal. In database 1, searches were carried out using the keywords "occupational health and safety" AND "bus driver's fatigue", in databases 2, 3, and 4 searches were carried out using the keywords "Occupational health" AND " bus driver's fatigue "; in database 2 is also carried out using the keywords 1) "occupational health" AND "bus driver's fatigue" and 2) "fatigue driver"; and in database 5 it is done using the keywords 1) "occupational health" and 2) "fatigue driver".

Based on database 1 was carried out using the initial filter of the text availability checklist "Free full text" and publication date "5 years"; on database 2 using the initial year filter "since 2015"; on database 5 using the initial filter "filter by year from 2018 to 2023"; whereas in databases 3 and 4 without using the initial filter. The search was conducted by the first author (AA) in the period 17 May 2023 to June 18, 2023.

3.3 Eligibility Criteria

Data were filtered by the first author using inclusion criteria, namely: 1) is original research, reviews, consensus statements, and guidelines which explain the implementation of occupational health and safety performed in public transportation of bus drivers, including traffic control, traffic and road transportation, causes multiple accidents, and types drivers of public transportation, whether all of these activities are found in one article or one of these activities; 2) Not a specific discussion regarding therapy/medical action/ certain exercise/ surgery given to fatigue accident case, and/or not comparing the effectiveness of a particular therapy/ medical action/ exercise/ surgery in a fatigue accidents case, even though it is located in a public transportation 3) Published between 2015 - 2022; 4) Written in English or other languages Indonesia; 5) The complete article can be accessed freely (free full text); 6) there is no duplication. While the exclusion criteria are any study that does not match the inclusion criteria above.

In addition, additional studies were identified by the first author by snowballing a list of references in full articles that met the inclusion and exclusion criteria. Meanwhile, the second author (ZD) supervised by checking twice and ascertaining whether the article search had answered the research questions.

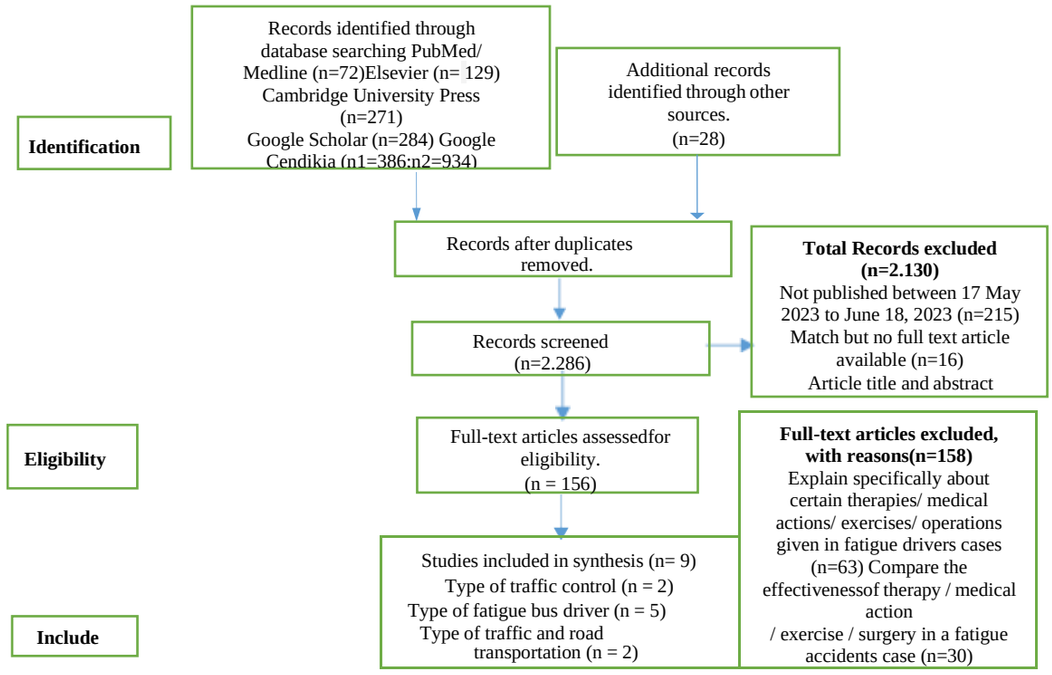


Figure 4. Study Selection with ScR Prism Diagram

2.4 Data Charting Process

The first author independently searched electronic databases for 31 days, from 17 May 2023 to June 18, 2023. Initially, the first author searched each database using keywords. Then the first author explored the research title and read the abstract based on the search results obtained from writing keywords. Research title and abstract that match the inclusion criteria, followed by full reading of the article by the first author.

In addition, the first author also snowballed the references obtained from full articles that met the inclusion criteria for exploration starting from reading the research title, abstract, and full article content as explained according to the steps above. After screening is complete, the second author checks the results obtained by the first author a second time.

The full article on the implementation of occupational health and safety at public transportation of bus drivers that meet the inclusion criteria is then grouped with fatigue driver classification approach contained in the Law Number 22 of 2009 concerning road transportation traffic, namely by traffic control, traffic and road transportation adjusted to the results of analysis of causes multiple accidents, and fatigue drivers of public transportation (in this case occupational health and safety); a fatigue accidents case, as well as a occupational health and safety case in general (if more than 2 elements of fatigue driver are described in one article).

We collected each group in tabular form and extracted the data included: author's name and year of publication, research title, research location, research objectives, type of research and research method or design, and research results. Table making was carried out jointly by the two authors to determine which variables to extract and independently map data from each article that met the requirements, then discussed the results. Then we analyze these results and draw conclusions.

4 Results and discussion

The initial search yielded 2,442 articles (Figure 1).

After removal of duplicate articles (n = 156), a total of 2286 studies were identified from electronic database search and review of article references for text screening by article title and abstract. After that, 2,130 articles were excluded because they did not meet the inclusion criteria and 156 articles were read in full. After assessment based on inclusion criteria, 147 articles were excluded for various reasons, resulting in a total of 9 article studies that would be subject to qualitative analysis and synthesis.

4.1 Study Characteristics

Of the 9 articles that were analyzed and synthesized, **5** articles were grouped into type of fatigue bus driver's, 2 articles were grouped into traffic control types, 1 article were grouped into traffic and road transportation types, and 1 article had more than one element in the organization occupational health and safety so that they are grouped into driver's fatigue in general. In the search results, no articles were found that met the type of fatigue bus driver's criteria.

4.2 Study Search Results

The results of the search for articles from the studies conducted were all grouped into the table for the implementation of occupational health and safety in the bus public transportation as shown in table 1.

Table 1. Effect Operational Conditions on Driver Fatigue Causes Multiple Accidents, case study at Indonesian Industry Public Transportation Bus in DKI Jakarta Classification Approach According to the Regulation of the Law Number 22 of 2009 concerning road transportation traffic, namely by traffic control, traffic, and road transportation.

Author Name and Year of Publication	Research Title	Research sites	Research purposes	Type of Research and Methods or Design Study	Research result
(Faramarz et al., 2015)	Correlation between Driver Subjective Fatigue and Bus Lateral Position in a Driving Simulator	-	For dealing with fatigued drivers are still in the exploratory phase, the aim of this study was to determine the correlation between driver mental fatigue and bus lateral position in simulated task.	Descriptive-analytical research was conducted on 30 professional male bus drivers participated in 2 hour driving session.	Fatigue levels had an increasing trend as the time-on-task of driving increased. Time-on-task of driving had the greatest effect on the fatigue self-evaluation
(Katherine et al., 2022)	Sleep, time, and space fatigue and performance deficits in pilots, commercial drivers and astronauts	-	To synthesize research findings about objective and subjective measures of sleep, fatigue, and performance from pilots, drivers, and astronauts	A scoping review	Some investigators found that pilots' prior sleep duration was significantly correlated with these fatigue measures
(Bhatt et al., 2016)	Driver behavior model analysis using hidden markov model to increase road safety in smart cities.	-	To propose driver behavior recognition method in terms of steering and brake using Hidden Markov Model (HMM). We are also proposing HMM-based actuation behavior model for obstacle avoidance using collision avoidance.	Collision avoidance using a Dempster-Shafer method based on evidence theory.	Analyze various driving maneuvers. Such as lane changing, lane keeping maneuvers and compare their results using various mechanisms and try to improve the results within less time.

(Beard et al., 1963)	The Causation of Bus Driver Accidents	-	Provides one of the best reviews of the problems involved, the results of which can be broadly	Curriculum Guidelines	Which the accident experience of the drivers could be correlated. The 1. results of the various experiments can be briefly described as inconclusive.
(Chakraborty et al.,1996)	An Efficient, Bus-Layout Based Method for Early Diagnosis of Bussed Driver Shorts in Printed Circuit Boards	-	This approach leads to an early diagnosis of more than 96% of shorts and simplifies the subsequent test for opens considerably. Besides, this approach improves the production yield and field survivability of boards.	Based approach to board-level shorts diagnosis for bussed drivers, with the goal of early repair of interconnect shorts.	The number of drivers/receivers per Unit net length tends to increase with the above ratio.
Traffic control					
(Feyer et al., 1995)	The influence of operational conditions on driver fatigue in the long-distance road transport industry in Australia Vol. 15	-	Identify possible strategies to better manage driver fatigue in the long-distance road transport industry.	Questionnaire was designed to obtain information about fatigue from drivers.	The results revealed that the experience of drivers in the passenger sector only partially overlapped that for the truck sector. The ways in which fatigue occurred and some of the contributors to fatigue showed remarkable consistency across sectors. There was major divergence, however, in the ways drivers reported managing fatigue.
(Hildén et al.,2018)	Modeling bus travel experience to guide the design of digital services for the bus context.	-	The findings of a three-week qualitative field study with ten regular bus passengers. Derived from the findings.	To gain deep insights about bus journey experiences, a qualitative field study approach was chosen. Ten participants participated in three-week study that included self-documentation period of bus trips using diaries	Our research results we aim at helping make public transportation more attractive option in city travel.

Traffic and road transportation					
Author Name and Year of Publication	Research Title	Research sites	Research purposes	Type of Research and Methods or Design Study	Research result

(Rastgoo et al., 2018)	A critical review of proactive detection of driver stress levels based on multimodal measurements. Vol. 51	-	Assist residency programs in determining learning objectives and clinical experiences relevant to sports medicine education.	Curriculum Guidelines American Medical Society for Sports Medicine, theAmerican Academy of Physical Medicine and Rehabilitation, and the Association ofAcademic Physiatrists	Terdapat 4 bidangtopik utama kurikulum denganfokus kedokteran fisik dan rehabilitasi: 1. *Musculoskeletalmedicine*. 2. Bidang kedokteran fisik dan rehabilitasi di dalam lingkup kedokteran olahraga lainnya; 3. Dasar ilmu kedokteran olahraga; dan Topik khusus dalam kedokteran olahraga.
Type fatigue bus					
(Zhang et al.,2016)	Driver classification based on driving behaviors. In: International Conference on Intelligent User Interfaces, Proceedings IUI.	-	Develop a model capable of classifying drivers from their driving behaviors sensed by only low-level sensors.	A window-based support vector machine model to classify drivers. We test our model with two datasets collected under both controlled and naturalistic conditions	Average classification accuracies attained with data collected from three different cars shared between couples in naturalistic environment were 75.83%, 85.83% and 86.67% using only phone sensors, only cars sensors and combined car and phone sensors respectively.

3.3 Result Synthesis

Based on the 9 articles that will be synthesized based on the search results, the scope of providing occupational health and safety on driver's fatigue is very broad, starting from information about traffic control, traffic, and road transportation, type of fatigue bus drivers as well as details of their last trip and last working week.

Occupational risk in the industry has a high level of risk which can cause accident related to death, disabling injury, minor injury, damage to property and environment. (Chen et al., 2013). Driver fatigue, as a direct or contributing factor in road accidents, is defined as a feeling of sleepiness caused by long periods of driving, monotonous roads, bad weather, or personal characteristics. (Faramarz et al., 2015), From an occupational health perspective, fatigue (a biological demand for recuperative rest) threatens safety and job performance (Williamson A, et al., 2011).

This scoping review highlights important findings about the variables that affect sleep, fatigue, and vigilance in these occupations in addition to illustrating the importance of developing interventions that could mitigate fatigue. (Katherine et al., 2022) For simplicity, the first assumption made is that the net drivers can be individually controlled. If this is not true, a group of drivers that are controlled simultaneously can be regarded as one driver. The other assumption made is that all the drivers are equally strong (Chakraborty et al., 1996).

The data for bus drivers indicated that off-duty time and rest periods, but not necessarily sleep duration, affected performance. Having >1 night to sleep between jobs was associated with significantly fewer lapses in attention on the PVT-B and fewer lane deviations while driving commercial at night (despite no significant increase in their mean sleep duration during the off-duty period) (Sparrow AR et al., 2016).

In this study, we found a strong significant correlation between the fatigue self-evaluation of the drivers of the bus. Recently, a few researchers have reported good agreement between sleepiness and driving impairment (Horne JA, et al., 1995, Maycock G et al., 1997, Neville KJ et al, 1994).

Researchers try to model the behavior of the driver in certain situations, for example in collisions or other accidents (e.g., Andreas L et al, 2009). Although of special importance, this is a very restricted perspective, because it only allows a view of the driver during a tiny time interval like 30 to 60 seconds. Therefore, it is not possible to make a general statement about the driver's state or behavior or monitor changes.

Several studies have been conducted on trip experience, satisfaction and behavior. Even though experience and driving comfort have been studied across driving modes – such as trains and aircraft – the findings and insights are not directly transferrable to intra–city bus transport. The characteristics of long-distance journeys differ from short distance intra-city bus journeys: duration of the trip, frequency of driving, type of the vehicle, and even the act of planning and preparing for the trips are different. Thus, we argue that our review study reveals themes and insights that contribute to and provide understanding of short distance bus journeys, activities people conduct during those trips, and the elements that impact the fatigue experience (Carreira L. et al, 2014).

3 COPYRIGHT FORM

For the mutual benefit and protection of Authors and Publishers, this review follows Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) guidelines with ISSN number 20085842 (Faramarz et al., 2015) and (Katherine et al., 2022)

4 CONCLUSIONS

The results of this scoping review revealed that the experience of drivers in the public transportation sector only partially overlapped that of the bus transportation sector. There was major divergence, however, in the ways drivers reported managing fatigue relevance to industry. The impact of current operational conditions on driver fatigue has important implications for establishing priorities for improving management problem of public transportation in Indonesia.

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THE EFFECT OF INFUSED WATER DATES (*Phoenix dactylifera*) ON HYPERTENSION PATIENTS

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Keywords: Hypertension, Infused Water, Date.

Abstract: The interplay of several risk factors encountered by an individual results in the multifactorial illness of hypertension. Starting at the age of 45, one of the elements that contribute to hypertension is age. Potassium and phenol chemicals make up the nutritional composition of date-infused water. This chemical acts as both an antioxidant and an antihypertensive. Infused water dates (*Phoenix dactylifera*) affected hypertension patients. A quasi-experimental approach with pre- and post-testing for two groups was adopted for the research study. All of the senior residents of Budi Dharma Kasih Nursing Orphanage, including 28 persons with hypertension, served as the study's participants. Then, treatment groups and control groups were created from the research participants. For seven days, 200 cc of water infused with dates was administered to the treatment group once daily. Shapiro-Wilk test for data normality and paired and independent t-tests for data analysis. Shapiro-Wilk's normality test revealed that the data findings were normally distributed. In the treatment group, systolic and diastolic blood pressure decreased by 7.57 mmHg (p=0.000) and 5.71 mmHg (p=0.000), respectively. A noticeable difference existed in the systolic and diastolic blood pressure of the experimental group before and after treatment with date-infused water.

1 INTRODUCTION

As one of the global public health issues, hypertension ranks third in terms of mortality behind TB and stroke (Yonata, A., And Satria, A., 2016). The World Health Organization (WHO) reports that hypertension affects around 1 billion people globally. According to estimates from 2013 (WHO), the continent with the highest prevalence of hypertension was Africa (46% of adults), while the continent with the lowest prevalence was America (35% of people). The prevalence of hypertension varies across Asia, ranging from 15 to 35%, and it is predicted that this number would keep rising year (Singh et al., 2016).

According to Basic Health Research (Riskesdas), cardiovascular disease complications affect women more frequently (52%) than males (48%) in Indonesia, The prevalence of hypertension was approximately 34.1% higher in 2018 than it was in 2013 when it was approximately 25.8% higher (Riskesdas). According to the Ministry of Health (2014), among the top 10 disorders affecting the elderly in Indonesia in 2013 was hypertension. Among all noncommunicable diseases reported in Central Java in 2017, hypertension accounted for the highest percentage (64.83%), making it the noncommunicable disease control priority in this region. Purbalingga regency accounted for 14.26% of the total, ranking it 11th out of 34 districts or cities (Central Java Health Office, 2017).

Degenerative disorders, such as cancer, hypertension, diabetes mellitus, gout (rheumatism), and coronary heart disease (CHD), are quite common in older persons (Karmitasari et al., 2018). Hypertension, a condition in which blood pressure increases persistently, is one of the disorders that affects the aged rather frequently. High blood pressure, often known as hypertension, is essentially a condition of the blood arteries that reduces the amount of nutrients and oxygen reaching the body's tissues (Destiara, H.Z., and Riris, D.R, 2017).

Hypertension, or high blood pressure, is defined as having both systolic and diastolic pressures exceeding 140 mmHg (Riska, A., and Bambang, B., 2015). Less than 130/85 mmHg is the blood pressure limit that WHO considers to be normal (WHO, 2013). Age, sex, genetics, stress, education, obesity, excessive salt consumption, inactivity, and vitamin D

deficiency are some of the risk factors that lead to hypertension (Pramana, 2016). Therefore, non-pharmacological treatment is required, including herbal treatment in this instance utilizing water infused with dates, which has low adverse effects and long-lasting results (Ilkafah, 2018). According to research, dates-infused water has a high concentration of potassium and phenol chemicals that have antioxidant and antihypertensive properties (Diah, 2015). According to nutrition fact, 100 g of dates provide 650 mg of potassium (Handini, 2018).

Dates are a nutrient-dense food because they are high in vitamins, minerals, and energy from carbs (glucose and fructose), have minimal protein and fat, and are full of energy. Researchers have previously tested levels of potassium of 15.23 mg/100 g and phenol chemicals of 19.04 mg/100 g in water infused with dates. Dates can be used as an alternative treatment for hypertension. Apart from being easily available because they do not depend on the season, dates are also preferred by the community because of their sweet and delicious taste. In the research that has been done, dates are only given in the form of dried dates (Husaidah et al., 2019). In other studies, dates were given in the form of juice (Anjora, 2018). Therefore, it is necessary to develop a simple processing method, such as making infused water. The advantage of infused water is that the nutritional content is maintained because there is no crushing process like making juice. Infused water is made by putting pieces of fruit into water and soaking them in a cooler or at room temperature for several hours. Infused water does not add sugar or other additives, so the aroma and flavor come from the fruit soaked in it. Giving infused water dates is one way to increase potassium intake and potassium levels in the blood, so it is expected that the increase in both intakes can reduce blood pressure. Therefore, the effect of dates-infused water on the elderly will be evaluated in this study to see if there is a reduction in anti-hypertension.

2 SUBJECTS AND METHODS

This research was a *Quasi Experimental* study. The research design was two group pre-test and post-test. The study used the intervention group and control group. The intervention group was hypertension elderly given dates-infused water one time/day with soaking time of 12 hours. This research was conducted at the Mind Dharma Love Nursing home. The time of the study was carried out from the beginning of the proposal process until the writing process of the thesis report in November 2019 – December 2019 and seven days for giving the dates-infused water once/day and collaboration with doctors and nurses.

The senior residents of Purbalingga's Mind Dharma Love Nursing Home made up the entire study's population. Sample size and sampling methods used in the study. According to the researcher's demand based on the study's aim or problem, as well as the characteristics of the intended subject, purposive sampling was employed as the sampling strategy in this study (Rachmat, 2015). The samples in this study were elderly in the Mind Dharma Love Nursing home in Purbalingga with a total of 28 respondents who have the inclusion criteria: Systolic Blood pressure >140 mmHg and diastolic blood pressure >90 mmHg in hypertension level 1 and level 2, age above 50 years old, elderly men and women with hypertension, not taking antihypertensive medication, being in the scope of the hostel and getting an intake from the same source. The Exclusion criteria for this research are patients with diabetic and chronic kidney disease. The number of samples in this study amounted to 28 respondents who were divided into two groups namely the control group (n = 14) and the intervention group (n = 14). Dates-infused water and blood pressure measurements for the intervention group, as well as blood pressure measurements for the control group, were conducted routinely for seven days without the use of anti-hypertensive medication. Ethical clearance was obtained from the Health Research Ethics commission of The Medical Faculty of the University of Muhammadiyah Surakarta No.2537/B.1/KEPK-FKUMS/XI/2019. Statistical analysis using paired t-test and independent t-test. The treatment group experienced a decrease in systolic and diastolic blood pressure.

3 RESULT

3.1 Respondent Characteristics

Respondents in this study are elderly with ages 50-90 years at Budi Dharma Love Nursing Home in Purbalingga. Based on research that has been carried out, obtained data regarding the description of the characteristics of respondents as follows:

Table 1. The characteristics of hypertension respondents by age and sex

Characteristics	Frequency	Percentage

		(%)
Age		
60-74	8	28.6
75-90	20	71.4
Gender		
Women	25	89.3
Male	3	10.7

3.1.1 Systolic Testing Experimental Group with Control Group

The independent sample analysis the following outcomes of the T test for systolic testing in the experimental group before being given water infused with dates in the control group:

Table 2. Test results of independent samples T test for systolic before testing experimental groups with control groups

	T	df	p-Value
Equal variances assumed	0.696	26	0.492
Equal variances not assumed	0.696	21.358	0.494

Based on the test results above it can be seen that the p-value shows the numbers 0.492 and 0.494. This p-value >0.05, which means that there is no difference between the systolic experimental group before treatment with dates-infusion water with systolic in the control group.

3.1.2 Diastolic Testing Experimental Group with Control Group

The results of the analysis with independent samples T test for diastolic testing of the experimental group before treatment with dates-infused water with systolic in the control group are as follows:

Table 3. The independent samples T test for diastolic before testing experimental groups with control groups

	T	df	p-Value
Equal variances assumed	0.091	26	0.929
Equal variances not assumed	0.091	24.132	0.929

Based on the test results above it can be seen that the p-value shows the numbers 0.929. This p-value >0.05, which means that there is no difference between the diastolic experimental group before treatment with dates-in fusion water with systolic in the control group.

3.1.3 Systolic Testing Before and After Treatment

The results of the analysis by paired sample T test for systolic testing of the experimental and control groups before and after treatment are as follows:

Table 4. The Paired Samples T Test for Systolic Testing Before and After Treatment

Systole				
Group	Mean ± SD		Δ ± SD	p-Value
	Pre (mmHg)	Post (mmHg)		
Control	143.71±3.17	145.93±2.37	2.21± 2.26	0.003
Experiment	142.57±5.26	135.00±5.48	7.57 ± 1.99	0.000

Based on the above test results it can be seen that the value experimental group showed a p-value of 0,000. The p-value <0.05, which means that there is a significant difference in the systolic experimental group between before and after treatment with dates-infused water. While the control group also had a difference between before and after the p-value of 0.003, the p-value <0.05. Although both are equal to 0.05, the p-value of the experimental class is still better than the control class.

3.1.4 Diastolic Test Before and After Treatment

The following are the findings of the study using paired samples T test for diastolic testing of the experimental and control groups both before and after treatment:

Table 5. Paired Samples T Test for Diastolic Testing Before and After Treatment

As can be observed from the aforementioned test findings, the experimental group displayed a p-value

Diastole				
Group	Mean ± SD		Δ ± SD	p-Value
	Pre (mmHg)	Post (mmHg)		
Control	90.29±1.77	92.86±1.46	-2.57±1.16	0.000
Experiment	90.21±2.36	84.50±2.50	5.71±1.07	0.000

of 0.000. This p-value is less than 0.05, indicating that

the diastolic experimental group's measurements before and after the date-infused water treatment differ significantly. The average blood pressure difference decreased by 5.71 in the experimental group whereas it rose in the control group.

3.1.5 Systolic Test Experimental Group with Control Group

The results of the analysis with independent samples T test for systolic testing of the experimental group after treatment with dates-infused water with systolic in the control group are as follows:

Table 6. The independent samples T test for systolic after testing experimental groups with control groups

	T	df	p-Value
Equal variances assumed	6.852	26	0.000
Equal variances not assumed	6.852	17.698	0.000

It is clear from the aforementioned test findings that the value indicated a p-value of 0.000. This result is less than 0.05, indicating that there is a difference between the experimental group's systolic blood pressure and the control group's systolic blood pressure following treatment with dates-infused water.

3.16 Diastolic Test Experimental Group with Control Group

The results of the analysis with independent samples T test for diastolic testing of the experimental group after treatment with dates-infused water with diastolic in the control group are as follows:

Table 7. The independent samples T test for diastolic after testing of the experimental group with the control group

	T	df	p-Value
Equal variances assumed	11.226	26	0.000
Equal variances not assumed	11.226	21.768	0.000

Based on the above test results it can be seen that the value showed a p-value of 0,000. This value <0.05, which means that there are significant differences in the diastolic experimental group after receiving treatment with dates-infused water with diastolic in the control group.

4 DISCUSSION

The Budi Dharma Love Nursing Home is situated in an urban region with the majority of the settlement and agricultural land on May Jend. Soengkono Road, Kalimanah Subdistrict, Purbalingga Regency. The dates of this study's execution are November 12–18, 2019. There were 28 respondents in this study, who were split into the intervention group and the control group. While the control group received no treatment, the intervention group received 200 cc of infused water. Dates: Around 10:00 WIB, infused water is administered following blood pressure readings. Thirty minutes following the date-infused water intervention, the second blood pressure reading was taken.

Age and sex characteristics are included in the general data, whereas the effect of date-infused water on hypertension in the elderly is included in the special data.

Given that the prevalence of hypertension tends to rise with age, general factors affecting study subjects must be taken into account. The findings revealed that the group of 20 adults aged 75 to 90 made up the majority of research subjects (71.4%). According to the Ministry of Health, over 75-year-olds had the greatest prevalence of hypertension, with a rate of 69.3% (WHO, 2018).

Age is a risk factor for hypertension that cannot be changed. With increasing age, the walls of blood vessels will begin to lose elasticity. Changes in the structure and function of the peripheral vascular system cause changes in blood pressure, especially in the elderly. The ability of the aorta and large arteries to accommodate the volume of blood pumped by the heart decreases, which results in decreased cardiac output and increased peripheral resistance, both of which lead to an increase in blood pressure (Nisa et al., 2019). These changes include atherosclerosis, decreased elasticity of the connective tissue, and relaxation of vascular smooth muscle.

According to the findings, there were 89 responders overall (89.3%) with 25 more women than males. One of the things that affects blood pressure is gender. According to the findings of Wahyuni and Eksanoto's (2013) study, women are more likely than males to have high blood pressure because some women undergo menopause, which leads to hormonal changes. In that research, 5.8% of males had hypertension, compared to 27.5% of women.

Hypertension treatment divided into two that is non-pharmacological treatment and pharmacological treatment. In this study using a type of non-pharmacological treatment, namely the treatment of

natural ingredients such as fruits, vegetables, and herbal plants. One of them is infused water palm which is drunk for a week by giving 1 day 1 time at 10:00 WIB.

According to Tables 4 and 5, the findings demonstrate that the respondent's blood pressure significantly differs before and after ingesting infusion water. Systolic blood pressure decreased by 7.57 mmHg with a p-value of 0.000 in the experimental group, while diastolic blood pressure decreased by 5.71 mmHg with a p-value of 0.000. This demonstrates the impact of consuming dates-infused water because blood pressure significantly drops after drinking it for seven days. Furthermore, the findings of systolic and diastolic blood pressure measures in the control group showed an average rise in systolic blood pressure of 2.21 mmHg and 2.57 mmHg, significantly. The increase in the control group could be due to uncontrolled food intake.

Infused water with a combination of Siamese Pumpkin, Lemon, Dates Deglet Nour, Red Ginger, and Mint Leaves as alternative antihypertensive beverages has a p-value of 0.000, while diastolic blood pressure has a significance value of 0.002, according to Handini's (2018) research. Systolic and diastolic blood pressure were significantly different before and after the infused water was administered. According to the study done on Poltekkes Kemenkes Yogyakarta students who had prehypertension, up to 4.8% of them had high potassium levels and up to 95.2% had normal potassium levels at the time of the pretest. All responders' post-test potassium levels were within normal range. Potassium levels can rise when date-infused water is administered; the p value is 0.002 (p 0.05) (Pratiwi et al., 2021)

This reduction in blood pressure cannot be explained solely due to infused water given because there are other factors that are not controlled such as the respondent's food intake, especially food sources of potassium and sodium, stress levels, and the state of the respondent when blood pressure is measured, but consume infused water this can be said to have contributed to the decrease in respondent's blood pressure because it could increase the intake of potassium, calcium and magnesium. Electrolytes play a role in regulating body fluids such as diuretics can reduce blood pressure (Handini, 2018).

Infused water date is a type of beverage containing drinking water and fruits with immersion in a certain time until the fruit juices and herbs come out and make the mineral water to have a taste in accordance with the fruit or herbs that are in it (Karmitasari et al., 2018). This drink is believed to be rich in vitamins and nutritional sources so as to maintain a healthy body. Therefore, this study is expected to contain potassium and antioxidant activity which is a compound that functions to maintain body health and reduce blood pressure (Susi, 2017).

Potassium is one of the minerals that are most prevalent in dates. According to Fitriyati (2016), 100 grams of dates contains up to 13.2 mg of vitamin C and around 652 mg of potassium. Along with sodium, chloride, and magnesium, potassium is an electrolyte that functions as the body's electricity and is a crucial mineral for the kidneys' physiological function. It is important to consume potassium to maintain the function of the heart, skeletal muscles, and smooth muscle contraction for digestion and movement in respondents who are older than 59 years old because there is a decline in the ability of various organs and systems in their bodies to function (Abdul, A., and Allaith, A., 2017).

Potassium can lower systolic and diastolic blood pressure by preventing the excretion of sodium and water. Renin circulates in the blood and lowers blood pressure by catalysing the conversion of angiotensin-to-angiotensin I. It can also increase the release of aldosterone. By causing salt retention, aldosterone raises blood pressure. The presence of potassium reduces sodium and water retention, which lowers blood pressure, cardiac output, peripheral pressure, and plasma volume (Husaidah et al., 2019).

Potassium in dried dates can reduce systolic blood pressure by inhibiting the release of renin and works by catalysing the breakdown of angiotensin-to-angiotensin I. Angiotensin I turn into angiotensin II with the help of Angiotensin Converting Enzyme (ACE). Angiotensin II then stimulates the release of aldosterone which causes blood pressure to rise by retaining sodium. Due to the presence of potassium in dried dates so that sodium and water retention decreases then there is a decrease in plasma volume, cardiac output, peripheral pressure (Husaidah et al., 2019). In addition, high potassium intake can increase endothelium vasodilatation through potassium, reducing intracellular calcium concentration, thereby decreasing smooth muscle contraction and systolic blood pressure will decrease (Kumala, 2014).

Potassium can increase sodium expenditure, decrease the response to the angiotensin II and norepinephrine systems, vasodilation of blood vessels and reduce the expenditure of calcium in the urine (Hamad et al., 2015). In addition, potassium also plays a role in preventing the narrowing of blood vessels by keeping the walls of large blood vessels elastic and optimizing their functions so that they are not easily damaged due to high blood pressure. With

the reduced risk of atherosclerosis, potassium activity will also play a role in the prevention of coronary heart disease and stroke (Fitriyati, 2016).

The mineral content other than potassium contained in dates-infused water is Magnesium. Magnesium can reduce blood pressure by working naturally like calcium change blockers. Binding of potassium, and endothelial vasodilation (Al-Farsi et al., 2015). Magnesium is used by the body to make a powerful vasodilator called prostaglandin E1. Besides magnesium can reduce blood pressure because it has the ability to regulate other minerals in cells such as calcium, potassium and sodium (Perry et al., 2018). Because of this combination that makes the diastolic blood pressure in the treatment group decreased significantly compared to the control group.

Vitamin C levels in dates-infused water reach 13.2 mg/100 grams. High intake of vitamin C is obtained from daily intake of fruits and vegetables. The risk of hypertension is reduced in someone who consumes foods containing vitamin C, fruits and vegetables. Vitamin C is a vitamin that can act as an antioxidant so that vitamin C is able to donate electrons to prevent oxidative stress. The active forms of vitamin C in the redox system include L-ascorbic acid, free radical monohydroxy L-ascorbic acid (AFR), and oxidized ascorbate or Docosahexaenoic Acid (DHA). Vitamin C as an antioxidant can disrupt the production of free radicals and peroxides. Vitamin C can increase prostaglandin synthesis associated with vasodilation (Amalia and Triyono, 2018). Research by Hazizah, (2021), there was a relationship between vitamin C and systole blood pressure (p value = 0.001) and diastole blood pressure (p value = 0.004).

Antioxidant activity obtained is influenced by total phenol levels and total flavonoids. Phenol and flavonoid compounds have a linear contribution to antioxidant activity, so the higher the levels, the better the antioxidants. Total phenol content in dates-infused water as much as 19.04 mg / 100 grams. Increased intake of flavonoids can reduce blood pressure because flavonoids can protect the cell structure of blood vessels, besides flavonoid content decreases blood pressure by inhibiting the action of angiotensin converting enzyme and is diuretic. Diuretic is a substance that can increase urine volume by increasing the excretion of sodium and water through the kidneys thereby reducing cardiac output. Flavonoids can increase urine volume by attracting sodium into the intracellular fluid and flowing into the kidney tubules, so that the volume increases and the Glomerular Filtration Rate (GFR) becomes high causing the kidneys to expel urine quickly (Handini, 2018). Angiotensin-converting enzyme (ACE) activity, which is crucial for controlling arterial blood pressure, can be inhibited by flavonoids. In order to determine the structural underpinnings of their bioactivity, 17 flavonoids from five structural subtypes were tested in vitro for their capacity to inhibit ACE (Guerrero et al., 2012).

5 CONCLUSIONS

In conclusion, the provision of dates-infused water has demonstrated a significant and favorable effect on reducing blood pressure in hypertensive elderly residents at Budi Dharma Love Nursing Home in Purbalingga. This finding holds substantial practical relevance, as it highlights a potential dietary intervention for managing hypertension among this population. However, it is essential to acknowledge the limitations of this study, such as the lack of control over certain variables and the small sample size. Further research with larger, diverse cohorts and longer-term assessments is warranted to confirm and expand upon these promising results. Additionally, future studies could delve deeper into the mechanisms behind the observed blood pressure reductions and explore the optimal duration and dosage of dates-infused water for hypertension management

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Assessing the Glycemic Index of Aloe Vera Beverages with Different Sugar Types

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Keywords: Coconut Sugar, Glycemic Index, Nata Aloe Vera, Rock Sugar, Palm Sugar.

Abstract: The glycemic index value of a food is a reference for a food ingredient that has the potential to increase or maintain blood sugar levels. Determining the glycemic index can use a graph of the increase and decrease in blood sugar levels. High blood sugar levels occur due to abnormal insulin secretion as a sign of metabolic disease which is often called Diabetes Mellitus. One way to control blood sugar is to eat foods low on the glycemic index. Aloe vera is a food ingredient that has the potential to lower blood sugar levels. However, when consuming aloe vera drinks need to add sweetness to increase their acceptability. Different types of sugar have different glycemic index values. The aim of this research was to determine the effect of adding palm sugar, rock sugar, and coconut sugar on the glycemic index value of aloe vera nata drinks. The research subjects were 10 respondents using a consecutive sampling method. The glycemic index values calculated for the aloe vera nata drink were 81.5 (rock sugar), 79.5 (palm sugar), 80.3 (coconut sugar), and 69 (control). Based on the Kruskal Wallis test, there was a significant difference ($p<0.05$) in blood sugar at 15, 30, 60, 90, and 120 minutes. The addition of sugar to the aloe vera nata drink which has the lowest glycemic index value is palm sugar.

1 INTRODUCTION

Diabetes Mellitus (DM) is a metabolic disease characterized by abnormal insulin secretion so that the pancreas cannot produce insulin or the occurrence of insulin resistance in the body. This causes high blood sugar levels or hyperglycemia (Azitha, *et al*., 2018). Normal fasting glucose levels are around 80-100 mg/dl and below 140 mg/dl at two hours after meals (Krisnatuti, M.S, *et al*., 2014). Insulin is released by beta cells in the pancreas gland as a way for glucose to enter the cells to be converted into energy. When there are issues with insulin function, glucose is unable to enter cells and instead accumulates in the bloodstream, leading to elevated blood sugar levels. Prolonged elevation of blood sugar levels, often resulting from insulin deficiency or insulin resistance, can trigger the onset of Diabetes Mellitus. DM sufferers experience symptoms such as frequent urination, constant thirst, rapid hunger, weight loss, and weakness. One of the parameters to determine the possibility of diabetes mellitus is to check blood sugar levels. Fasting blood sugar levels of more than 140 mg/dl or 150 mg/dl at two hours of examination are a sign that blood sugar levels are high (Syauqi, 2015).

Routine blood sugar control and eating arrangements are ways that are considered effective in controlling diabetes mellitus. Eating arrangements, especially with balanced nutrition, can control ideal body weight and blood sugar levels. In addition, the selection of food ingredients that contain a low glycemic index is very good at suppressing the severity of diabetes mellitus (Tandra, 2017). The

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glycemic index value in a food source of carbohydrates as a reference for a food ingredient has the potential to increase or maintain blood sugar levels in the body if you consume it (Sunarti, 2017). Simple carbohydrates can be broken down very quickly by the body because they are easily digested, one example is sugar. Sugar consumption in people with diabetes mellitus needs to be limited so as not to aggravate the increase in blood sugar levels (Lean, 2013).

Aloe vera leaves contain chromium and alprogen which have the effect of reducing blood sugar levels. Nata aloe vera is a low-calorie food, non-toxic and rich in fiber both recommended for low-calorie diets (Yulianto, 2013). The acceptability of nata aloe vera can be enhanced by adding sweetness from different types of sugar. Different types of sugar have different nutritional levels so that they can affect the glycemic index in aloe vera drinks (Estiasih, *et al*., 2015). The determination of the glycemic index with the determination of graphs of increase and decrease in blood sugar (Istiqomah, 2015)

The prevalence of people with diabetes mellitus in Indonesia continues to increase. This is a serious problem that requires an immediate solution. Nata aloe vera is one alternative intervention for people with diabetes mellitus by knowing the type of sugar that has a low glycemic index value that is safe to consume. So, it is necessary to conduct a study related to the glycemic index value of nata aloe vera beverages with the addition of palm sugar, rock sugar, and coconut sugar.

2 SUBJECTS AND METHODS

The subject was 10 respondents with 5 treatments, which have fulfilled the characteristics of inclusion (aged 19-23 years, active college student female Gontor Darussalam University, having a normal BMI (18.50 kg/m2 -24.99 kg/m2), good condition) and exclusion (have a history of chronic disease, diabetes mellitus, gastrointestinal problems, smoking, drug use, being in drug therapy, have an allergy to food standards and food test). The method of sampling was Consecutive Sampling or Quota Respondents. The process of determined respondents began with anamnesis about the identity and history of the disease, then a physical examination includes vital signs, weight and height. Respondents who met the inclusion criteria and were willing to take part in the study were given informed consent.

This type of research was an experimental study, to determine the glycemic index of aloe vera beverages with the addition of rock sugar, palm sugar, and coconut sugar (figure 1). The determination of the glycemic index with the determination of graphs of increase and decrease in blood sugar (Istiqomah, 2015) was carried out using the following formula:

$$(IG = \frac{\substack{area\ under\ the\ blood\ glucose\ response\ curve \\ after\ two\ hours\ of\ the\ test\ food}}{\substack{area\ under\ the\ blood\ glucose\ response\ curve \\ after\ two\ hours\ to\ standard\ food}} x100)$$

The area under the curve was calculated using the trapezoid method manually and using Microsoft Excel. Calculating GI as the mean of the individual ratios. The trapezoid method by calculating the area of all trapezium structures in a blood sugar rise curve which is then added up. Trapezium building area was calculated by the formula:

$$(AUC = (\frac{A}{2}x15) + (\frac{A}{2} + \frac{B}{2}x15) + (\frac{B}{2} + \frac{C}{2}x30) + (\frac{C}{2} + \frac{D}{2}x30) + (\frac{D}{2} + \frac{E}{2}x30))$$

Blood sampling on Fasting Blood Sugar (FBS) before feeding and check at 15, 30, 60, 90, and 120 minutes after giving the test food was eaten for 2 hours. Each treatment was given a distance of 3 days to avoid bias from each treatment. Results are presented in the form of mean±SD. Differences in blood sugar levels in each food test using the Kruskal Wallis test there were significant comparisons ($p<0.05$) using SPSS 21 (IBM, Chicago). Ethical Clearance was held at Moewardi Hospital with code number 1.324/XII/HREC/2019.

The instrument used for weight measurement used a digital scale on a single tile. The subject stood in the middle of the scale with a view facing straight ahead. Body weight was measured to the nearest 0.1kg a brand GEA EB-9370. The height measurement tool used microtoise with a length of two meters, pressed on the wall a brand GEA SH-2A Stature meter. The subject stood up straight, both feet tight, knees perpendicular, and heels, buttocks, and shoulders back against the wall surface. The blood sugar measurement tool used a brand glucometer *easy touch* GCU. The ingredients were used fresh aloe vera obtained from Yogyakarta, brown sugar and rock sugar obtained from Mantingan, palm sugar obtained from Wonosobo.

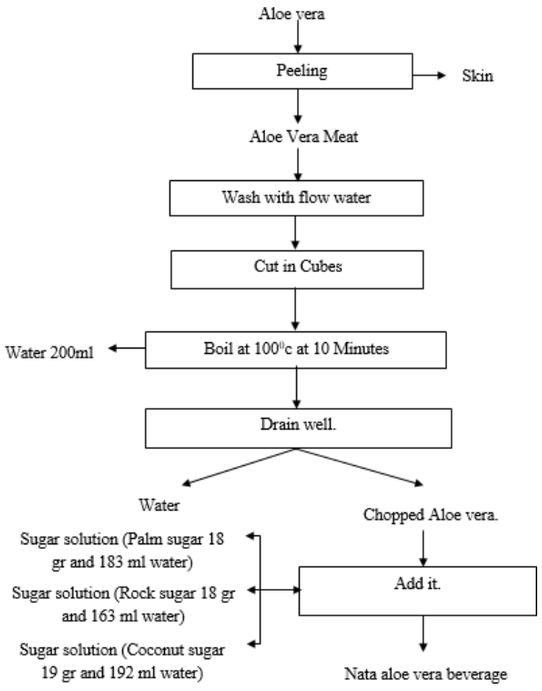

Figure 1: Flow Chart of Making Nata Aloe Vera Beverage.

3 RESULTS

The average age of respondents was 21 years while the mean body mass index was 21.19 kg/m^2 the respondents selected (table 1).

Table 1: Characteristics of Respondents.

Measurement Type	Average	Min	Max
Age (year)	21.3	20	23
Weight (kg)	51.06	42.7	57.7
Height (cm)	154.8	145	160
BMI (kg/m^2)	21.19	19.96	23.08

Blood sugar test results on each food test. In the Kruskal Wallis test to analyze the average difference between groups if the distribution was not normal, in table 2 and 3 showed the results of the Kruskal Wallis analysis, there were insignificant results (p> 0.05), namely the Fasting Blood Sugar (FBS). In each food test, there was a significant comparison (p <0.05) on blood sugar intake at 15, 30, 60, 90, and 120 minutes. The average blood glucose level examination results in the first 15 minutes and every 30 minutes to two hours of examination of standard foods and some test foods. In the examination of FBS in each test food, there was no significant difference with significant values between groups (p> 0.05).

There was a difference in blood sugar levels in the 15th minute after the test food was given, blood sugar levels experience an increased from FBS. In giving sugar without aloe vera has increased blood sugar levels but lower that was 79.7 mg/dl there was a difference in blood sugar levels without sugar nata aloe beverages with other test materials. Aloe vera beverage with added palm sugar there was a blood sugar level of 105.1 mg/dl, white bread had a blood sugar level of 110.7 mg/dl, aloe vera beverage with the addition of brown sugar there was a blood sugar value of 111.5 mg/dl, aloe vera beverage with the addition of rock sugar there was a blood sugar level of 118 mg/dl. The four samples were not significantly different.

Table 2: Blood Sugar Test Result FBS, 15, and 30 Minutes.

Test Sample	Time to Take		
	FBS	15 min	30 min
Bread	72.2±11.5^a	110.7±24.0^a	120.2±29.8^b
Rock Sugar	73.4±14.6^a	118±19.6 ^{a}	94.6±19.9^a
Palm Sugar	72.8±9.0^a	105.1±14.9^a	86.1±13.1^a
Coconut Sugar	78±9.4^a	111.5±16.7^a	88.5±18.0^a
Without Sugar	76.7±11.1^a	79.7±11.1 ^{b}	80.7±6.0^a
Sig.	*0.641^{Tn}*	*0.000***	*0.002***

Table 3: Blood Sugar Test Result 60, 90, and 120 Minutes.

Test Sample	Time to Take		
	60 min	90 min	120 min
Bread	106.3±27.5^b	96.3±20.8^b	90.3±20.5^b
Rock Sugar	75±7.3^a	74±5.6^a	69±14.6^a
Palm Sugar	75.7±6.4^a	73±9.8^a	71.1±94.1^a
Coconut Sugar	80±9.2^a	71.5±11.8^a	70±9.4^a
Without Sugar	73.8±11.4 ^{a}	71.7±9.7^a	62.9±10.3^a
Sig.	*0.001***	*0.002***	*0.012***

**: Very Significant. *: Significant. *Ns*: Not Significant. FBS: Fasting Blood Sugar

^{a}: Notification There were no significant differences between groups

[b]: Notification that shows that there are significant between groups

The results of glycemic index values in nata aloe vera drinks with the addition of palm sugar, rock sugar, and coconut sugar can be seen in full in table 4. The addition of palm sugar in nata aloe vera drinks has the lowest glycemic index value compared to the addition of other types of sugar.

Table 2: Glycemic Index Values Results.

Test Sample	GI	Category*
Nata and Rock Sugar	81.5±1.66	High
Nata and Palm Sugar	79.5±1.44	High
Nata and Coconut Sugar	80.3±1.60	High
Nata	69 ±1.74	Medium

*: <55 low GI, 56-69 medium GI, >70 high GI (Sunarti, 2017).

4 DISCUSSIONS

Respondents were used 10 people. In a study (Dereje, *et al*., 2019) which says that 10 respondents in the GI study could provide meaningful results. In this study using respondents with criteria, the normal nutritional status of the BMI was 21,194 Kg/m^2, in a healthy condition, and has a normal FBS with an average of 72.2 mg/dl. In research by Kisningsih., (2018) based on the results of research on the influence of BMI on Glycemic Index status respondents who have normal nutritional status experience normoglycemia, due to proper nutrition intake and always control health.

In connection with the study Hidayatullah, *et al*., (2017) state that the inclusion criteria in GI research include. Normal BMI (18.5-22.9 kg/m2) and FBS value (60-110 mg/dl) have never been diagnosed with DM or glucose tolerance, are not taking drugs, are not on a special diet, and have no history of chronic disease. Kisningsih., (2018) research, based on the results of research on the influence of BMI on Glycemic Index states that respondents who have normal nutritional status experience normoglycemia, due to proper nutrition intake and always control health.

After eating high carbohydrate foods, blood sugar levels increase from fasting blood sugar levels around 80-100 mg/dl to levels around 120-140 mg/dl in a period of 30 minutes to one hour. Blood sugar concentrations begin to decrease, returning to fasting in about 2 hours after eating (Reynolds, *et al*., 2018). The main factor that plays a role in regulating blood glucose levels is the concentration of blood glucose and hormones, especially insulin and glucagon. When the blood glucose level rises after eating, the increase in glucose concentration stimulates the pancreas B cells to secrete certain amino acids, especially arginine and lelusin, which also stimulates insulin and pancreas release (Marks, *et al*., 2000).

Based on several studies, aloe vera contains polysaccharides that can function to control blood sugar levels, stimulate antioxidant production, and can lower cholesterol Aloe vera juice can increase nutrient absorption and maintain homeostasis of blood sugar levels (Nandal *et al., 2012).* Aloe vera with nutrients such as Cr, Zn, and Mn which have hypoglycemic effects that have been used in interventions for people with diabetes mellitus in various countries (Manjunath K, *et al., 2016*).

Aloe vera possibly improved glycemic control in prediabetes and diabetes type 2, aloe vera lowered FPG (Fasting Plasma Glucose) only, with an absence of effect on HbA1c, aloe vera attenuated the absorption of glucose in the gastrointestinal tract after consuming food. It also stimulated glucose catabolism and suppressed glucose production. It is possible that the effect of aloe vera on FPG and HbA1c would have been more pronounced if the treatment had lasted at least 6 months (Manjunath K, *et a*l., 2016). The hypoglycemic effect of aloe vera is by enhancing glucose metabolism aloe vera has been used as an herbal medicine (Choudhary, *et al*., 2014).

Dietary fiber has a very important function in health maintenance, disease prevention and as an important component in nutritional therapy. High-fiber foods can help in lowering blood glucose levels by increasing satiety longer (Soviana, *et a.*, 2019). The mechanism of fiber can help reduce blood glucose levels, namely food fibers, especially water-soluble fibers can form more viscous food (forming a gel) and make food undigested by digestive enzymes. Foods that have been more viscous will slow down the process of emptying the stomach and cause food digestion to be slow. This slow digestion causes a decrease in the absorption of nutrients including glucose. Emptying of the stomach slows down and slow digestion creates a feeling of fullness longer, making food intake decrease (Sumarti, 2017).

A decrease in glucose absorption and decreased food intake will make blood glucose levels lower / normal. In the next mechanism of fiber that cannot be digested by digestive enzymes will cause food fibers to enter the large intestine intact. Fiber that is still intact in the large intestine is then fermented by bacteria in the large intestine to form SCFA (Short-

Chain Fatty Acid). The formation of this SCFA induces the secretion of the hormone GLP-1 (Glucagon Like Peptide-1), GIP (Gastric Inhibitory Polypeptide), and PYY (Peptide YY) which will increase insulin sensitivity and ultimately cause a decrease in glucose levels in the blood (Sumarti, 2017).

In the study of the Effectiveness of Giving Aloe Vera Stew Water on Decreasing Blood Sugar Levels in Type II Diabetes Mellitus Patients (Ariska, *et al*., 2013), there were differences in blood sugar levels before and after the intervention of aloe vera cooking water p=0.016. In the study of the Effect of Aloe Vera in Lowering Blood Glucose Levels on Diabetes Mellitus (Aveonita, 2015), based on the results of study found that 10 respondents given aloe vera juice 70% decreased blood sugar with the results of the independent t-test p=0.001. In line with the Mann-Whitney test, there were differences in blood sugar levels 15 minutes after administration of test material and 2 hours after administration of white bread with a comparison of aloe vera drinks without sugar obtained significant results p=<0.05, which means there were differences in levels blood sugar in the provision of white bread and nata aloe vera drinks without sugar. There was a difference in the 15th minute in the provision of test materials and aloe vera drinks without sugar.

Chromium is an essential element and is absent in refined sugar (0.02 mg/kg), but brown sugar has three times more chromium (0.064 mg/kg) (Abundix, 2017). Chromium improved insulin sensitivity and glucose handling in a number of animal models of type-2 diabetes. Chromium potentiates the action of insulin, augments the insulin signaling pathway, and up-regulates cellular glucose uptake (Hua, *et al.*, 2013).

In the Mann-Whitney test, there were no significant differences between the test groups of aloe vera drinks that were given added sugar with a significant value of (p>0.05). This is similar to the study (Mufti, et al., 2015) Comparison of Blood Sugar Levels After Giving Honey, White Sugar, and Brown Sugar in Fasting Young Adults based on research results of the Repeated Anova test, the significant value is (p>0.05) which means no significant difference was found between the increase in blood sugar levels after administration of honey, white sugar and brown sugar. According to the journal Honey for Nutrition and Health, the glycemic index contained in food or drinks, will affect changes in blood sugar levels. The intake of 50 grams of honey by a healthy person result in a slight increase in insulin levels and glucose levels. Foods that contain white sugar and brown sugar tend to increase blood sugar quickly (Bogdanov, *et al*., 2008).

Carbohydrates derived from different plants have different glycemic responses, differences in glycemic responses may occur in carbohydrates originating from the same plant but different varieties (Hoerudin.,2012). Foods that increase blood sugar levels quickly have high GI, whereas foods that raise glucose levels slowly have low GI. The GI value is calculated based on the ratio between the area of the increase in blood sugar curve after consuming the food tested with the increase in blood sugar after consuming a standard reference food, such as glucose or white bread (Cummings, *et al.*, 2007).

According to (Brown, 2008) low and high GI foods can be distinguished by the speed of digestion and absorption of glucose and fluctuations in blood levels. Low GI foods experience a slow digestive process, so the rate of emptying the stomach takes place slowly. Causing food suspension to reach the small intestine more slowly so that glucose absorption in the small intestine becomes slow. Finally, fluctuations in blood sugar levels are relatively small which is aimed at the gentle glycemic response curve. High GI foods characterize the rate of emptying the stomach, carbohydrate digestion, and glucose absorption which takes place quickly, so that fluctuations in blood sugar levels are also relatively high. This is because glucose absorption mostly occurs only in the upper small intestine (Gropper, *et al*., 2009).

Factors that affect GI in other foods are fiber content. The presence of dietary fiber can affect blood sugar levels and contribute to low GI values. Fiber can slow the rate of food in the digestive tract and inhibit the activity of enzymes so that the digestive process, especially starch, becomes slow and the response of blood sugar will be lower so that the GI becomes low. Comparison of amylose and amylopectin, starch digestibility, fat content, and protein (Arif, *et al.*, 2013). The fiber content of Aloe vera is 0.3g with a water content of 99.2g so the glycemic index value in aloe vera drinks without the addition of sugar has a moderate glycemic index value (Ervira, 2015).

In Nussa's research, (2017) about the glycemic index of mold, crystalline, and liquid coconut sugar in the study there was the result of the t-test showed that there was no significant difference (p>0.05), between the glycemic index of printed coconut sugar and crystal (p=0.114), glycemic index of printed and liquid coconut sugar (p=0.118), and glycemic index of crystalline and liquid coconut sugar (p=0.876).

Aloe vera glycemic index value with the addition of rock sugar was a minimum value of 54 and a maximum value of 107 with an average value of 81.5. Aloe vera glycemic index value with the addition of palm sugar was a minimum value of 55 and a maximum of 96 with an average value of 79.5. The glycemic index value of the aloe vera drink with the addition of coconut sugar was a minimum value of 55 and a maximum of 103 with an average value of 80.3. The value of the glycemic index of aloe vera drink without sugar addition was a minimum value of 40 and a maximum of 88 with a value of an average of 69.52. The standard deviation value indicates that the glycemic index value among ten respondents was not far from the average value. Measurement of glycemic index value can be accepted if the standard deviation value is ≤20% (Wolever., 2006). Shows that the glycemic index value of rock sugar, palm sugar, and coconut sugar in medium to high aloe vera drinks.

In the study of Ulaan et al., (2017) Effect of Comparison of Palm Sugar Type on the Sensory Quality of Halua Peanuts, it was obtained that the palm sugar PH is 6, the lower the PH will affect the low content of sucrose. In research Riawan, (2017) Glycemic Index of Mold Palm Sugar and Crystal there is a glycemic index value on printed mold sugar that is 62.47. In Nussa's research, (2017) Glycemic Index of Mold, Crystalline, and Liquid Coconut Sugar, there was a test of the sweetness level of 81.57 printed palm sugar. The result of the glycemic index value is 67.6. This is in line with research on the addition of coconut sugar and palm sugar to Aloe Vera drinks. There are almost the same results, namely in palm sugar, there is a glycemic index value of 79,5 and coconut sugar of 80.3.

The benefits of aloe vera drinks in addition to lowering blood sugar levels (Manjunath K, *et a*l., 2016) also get a moderate glycemic index, so aloe vera drinks are good for diabetics. Differences in taste in aloe vera drinks in the addition of rock sugar there is a very sweet taste of clear color, in the addition of palm sugar there is a sweet taste but more to the bitter light brown, in the addition of coconut sugar there is a dark chocolate sweet taste. brown sugar has three times more chromium (Abundix, 2017), and has GI for palm sugar 79,5 and coconut sugar 80.3.

There is no prohibition to consume foods with high glycemic index and one may eat foods with low glycemic index as much as possible. One way to consider also the portion of food consumed. To work around this, might be able to combine foods with a high glycemic index and foods with a low glycemic index. (Rimbawan, *et al.*, 2004).

In the study Mayawati, *et al*., (2017), namely the Relationship between High Glycemic Index Food Intake and Physical Activity with Blood Glucose Levels in Type II Diabetes Mellitus Patients. There is no relationship between high glycemic index food intake and blood glucose levels. In addition to food intake with high GI other factors such as carbohydrate intake also affect blood glucose levels. Another factor that can affect the increase in blood glucose levels is diet, besides the duration of suffering from DM can also affect blood glucose control.

5 CONCLUSIONS

The glycemic index value of nata aloe vera drink with the addition of palm sugar, rock sugar, and coconut sugar is the lowest value is with the addition of palm sugar, which is 79.5. The glycemic index value >70 belongs to the high category. But when compared to the types of rock sugar and coconut sugar, palm sugar can be recommended as an addition to nata aloe vera drinks

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RELATIONSHIP BETWEEN CONSUMPTION OF SUGAR-SWEETENED BEVERAGES, KNOWLEDGE AND HABITS OF READING NUTRITIONAL VALUE INFORMATION WITH NUTRITIONAL STATUS OF STUDENTS SMK FADILAH SOUTH TANGERANG

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Keywords: Adolescent, Knowledge, Nutrition Label, Nutritional Status, Sugar-Sweetened Beverage

Abstract: The nutrition information label is part of the food label on packaged food products. Knowledge and habits of reading nutritional value information influence the choice of well-packaged foods, such as sugar-sweetened beverages, which can cause nutritional problems. This study aims to determine the relationship between the consumption of sugar-sweetened beverages, knowledge and the habit of reading nutritional value information with the nutritional status of students at SMK Fadilah South Tangerang. This study used a cross-sectional method with a proportional stratified random sampling technique. The data collected were data on nutritional status, consumption of sugar-sweetened beverages, knowledge and habits of reading nutritional value information, using interview techniques and questionnaire instruments, namely the Semi-Quantitative Food Frequency Questionnaire, knowledge and habits of reading nutritional value information, then analyzed using the chi-square test with a significance level of 5%. The results showed a significant relationship between the consumption of sugar-sweetened beverages and nutritional status. However, there is no significant relationship between knowledge and habit of reading nutritional value information and nutritional status. Most vocational school teenagers habitually read information about poor nutritional value, with a nutritional status of at most 80.95%.

1 INTRODUCTION

Overweight and obesity are the accumulation or deposition of excessive fat, which can seriously endanger health (WHO, 2021). Overweight and obesity are a problem that is quite worrying for the health of adolescents. The main impact of overweight and obesity is causing an increase in non-communicable diseases, such as cardiovascular disease, diabetes, musculoskeletal disorders, hypertension, cancer, and even obesity can cause death (Ferretti & Mariani, 2019; Hruby et al., 2016). According to data published by the World Health Organization (WHO) in 2016 globally, more than 124 million children and adolescents are overweight and obese with an age range of 5-19 years. The prevalence of overweight and obesity in 1975 was 4% but increased drastically to 18% in 2016 (WHO, 2021). In Indonesia in 2018, there was also an increase in overweight and obesity in adolescents aged 16 to 18. Compared to the 2013 RISKESDAS data, the incidence of overweight was 9.5%, and obesity was 4% in 2018 (Kemenkes RI, 2018a), while in 2013, the prevalence of overweight was 5.7% and obesity was 1.6% (Kemenkes RI, 2013a). In the city of South Tangerang, in the 2018 Banten Basic Health Research (RISKESDAS) provincial report, the prevalence of adolescents age range of 16 to 18 years who were overweight was 5.04%, and obesity was 3.65% (Kemenkes RI, 2018b).

Overweight and obesity can be caused by the high interest of adolescents in consuming sugar-sweetened beverages. This is evidenced in research (Martin-Calvo et al., 2013); adolescents aged 15 to 18 years who consume sugar-sweetened beverages in the high category (> 4 servings/week) will have the potential to be 3.5 times more likely to experience obesity. The

mushrooming of shops selling packaged sugar-sweetened beverages around the youth environment makes teenagers consume a lot of sugar-sweetened beverages. Based on RISKESDAS 2018 data, more than 50% of Banten residents aged 15-18 years consume sweet drinks more than one time per day(Kemenkes RI, 2018b).

The increased risk of overweight and obesity in adolescents can also be caused by the lack of utilization of nutritional value information labels on packaging (Miller & Cassady, 2015). The development of the era of technology, industry, and culture has encouraged adolescents' diets to adapt to choosing packaged food and drinks that are affordable and practical. The problem of obesity can arise due to a lack of knowledge about nutritional value information on food and beverage packaging (Miller & Cassady, 2015). Based on research on adolescents who have sufficient knowledge of nutritional status, obesity is 21.2% lower than adolescents with normal nutritional status as much as 51.5%, and the ability to read nutritional value information labels in adolescents is still lacking as much as 68% (Anggraini et al., 2020; Badriyah & Syafei, 2019).

The habit of reading nutritional value information labels is very useful for helping adolescents choose food according to their needs, especially for food content that needs to be limited, such as fat, salt, and sugar (Kemenkes RI, 2014). However, adolescents' habit of reading these labels is still very low. This is evidenced in research (Sinaga & Simanungkalit, 2019); out of 98 Depok Pharmacy Vocational High School students, there were 77 students did not read nutritional value information labels.

The habit of reading nutrition labels can be linked to maintaining health by helping a person determine the best and healthiest foods to prevent future illnesses (Veríssimo et al., 2019). Research results (Melinda & Farida, 2021) prove that adolescents who have a positive attitude influence the behavior of reading nutritional labels in choosing packaged food products.

Based on a preliminary study conducted at Fadilah Vocational School, South Tangerang, out of 33 Fadilah Vocational students, 6.1% were overweight, and 12.1% were obese. Many students had less energy intake, namely 98.6% and 37 light activities 5%. Therefore, researchers are interested in conducting research on adolescents at SMK Fadilah, South Tangerang, the research that will be conducted includes the dependent variable, namely nutritional status in adolescents, and the independent variables, namely knowledge of nutritional labels, the habit of reading nutritional labels, and consumption of sugar-sweetened beverages for adolescents at SMK Fadilah South Tangerang.

2 SUBJECTS AND METHODS

This research is a quantitative study with a cross-sectional design. This research was conducted at Fadilah Vocational School, Pondok Aren District, South Tangerang City, and the time of this research was conducted on 8-9 February 2023. The population in this study totaled 136 students. The number of subjects in this study was 64 subjects. The technique for selecting subjects in this study used proportionate stratified random sampling by determining subjects based on inclusion criteria: active students at Fadilah Vocational School and willing-to-be research respondents, students aged 15-18 years. The exclusion criteria are students with coughs and colds or symptoms of COVID-19 and students with physical disabilities or disabilities. The analytical method used is analysis to see the picture and bivariate analysis to see the relationship using the chi-square test.

Data on the characteristics of the respondents were obtained through questionnaire interviews. The data contained in the questionnaire are name, gender, date of birth, age, class, WhatsApp number, and pocket money. Adolescents are aged 15, 16, 17, and 18 years. Gender includes male and female. Pocket money is divided into < 20.000/day and ≥ 20.000/day.

Data on nutritional status were obtained from measuring body weight using a digital scale, while for height using a microtome and for calculations using BMI/U with WHO anthro plus analysis. Nutritional status was classified into four categories: thinness (<-2 SD), normal nutrition (-2 SD to +1 SD), overweight (>+1 SD to +2 SD), and obesity (>+2 SD).

Data on the consumption of sweetened drinks in the last month were through interviews using the Semi-Quantitative Food Frequency Questionnaire to obtain the average daily sugar intake in sweetened beverages. Consumption of sweetened drinks is classified into two, namely excessive (> 50 g/day) and sufficient (≤ 50 g/day).

Nutritional value information knowledge data was obtained through a knowledge questionnaire. The results of combined knowledge are three, namely less (score <60%), sufficient (score 60 – 80%), and good (score> 80%). The knowledge questionnaire has 11 questions related to the ability to interpret nutritional value information.

Data on the habit of reading nutritional value information was obtained through a questionnaire with a Likert scale rating, namely 1: never, 2: rarely, 3: often, and 4: always. Respondents' answers are summed according to the Likert scale assessment. The results of the habit of reading nutritional value questionnaires were categorized into three, namely less (score <26), sufficient (score 26 - 39), and good (score ≥40). The habit of reading nutritional value information questionnaire there are 13 questions.

3 RESULTS AND DISCUSSION

3.1 Univariat

Table 1: Distribution of adolescent characteristics (n = 64).

Variable	n	%
Age		
15 Years	27	42,2
16 Years	30	46,9
17 Years	7	10,9
Gender		
Male	33	51,6
Female	31	48,4
Pocket Money		
< 20.000/day	23	35,9
≥ 20.000/day	41	64,1

Table 2: Distribution of adolescent characteristics, nutritional status, sugar-sweetened beverages, knowledge of nutritional value information, and habit of reading nutritional value information.

Variable	n	%
Nutritional Status		
Thinnes (<-2 SD)	5	7,8
Normal (-2 SD sd +1 SD)	43	67,2
Overweight (>+1 SD sd +2 SD)	13	20,3
Obesity (>+2 SD)	3	4,7
Sugar-Sweetened Beverages		
Excessive (>50 g/day)	25	39,1
Sufficient (≤ 50 g/day)	39	60,9
Knowledge of Nutritional Value Information		
Less (Score <60%)	29	45,3
Sufficient (Score 60 – 80%)	30	46,9
Good (Score >80%)	5	7,8
Habit of Reading Nutritional Value Information		
Less (Score <26)	42	65.6
Sufficient (Score 26 – 39)	18	28.1
Good (Score ≥40)	4	6.3

3.1.1 Responden Characteristics

Based on the results of Table 1, it is known that the percentage of the most adolescent age category is in the 16-year-old category of 46.9%. Males, namely 51.6%, dominate the highest proportion of gender in adolescents. Most respondents with an allowance amount ≥ 20.000/day (64.1%) with an allowance range of 20.000 to 50,000, compared to respondents with an allowance amount <20.000/day (35.9%) with an allowance range of 10.000 to 15.000.

3.1.2 Nutritional Status

Based on the results of Table 2, it is known that the most respondents in the category of normal nutritional status with a Z-score of -2 SD to +1 SD are 43 people (67.2%), while the least number of respondents are in the obese category with a Z-score > +2 SD is as many as 3 people (4.7%).

3.1.3 Consumption of Sugar-Sweetened Beverages

Based on the results of Table 2, it is known that most respondents with sufficient sugar intake, namely ≤50 grams/day in sugar-sweetened beverages (60.9%), compared to respondents with excessive sugar intake, namely <50 grams/day in sweetened beverages (39.1%).

3.1.4 Knowledge of Nutritional Value Information

Based on the results of Table 2, it is known that the respondents with sufficient knowledge regarding the ability to interpret nutritional value information with a score of 60 - 80% are 30 people (46.9%). The results obtained from the knowledge value of the lowest nutritional value information is 36.36, and the most significant value is 100, with an average of 61.79 and a median of 63.64.

3.1.5 Habits of Reading Nutritional Value Information

Based on the results of Table 2, it is known that the majority of respondents who have less the habit of reading nutritional value information with a score <26 are 42 people (65.6%). These percentages show that most respondents need to gain the habit of reading nutritional value information.

3.2 Bivariat

Table 3: Relationship between consumption of sugar-sweetened beverages, knowledge, and habit of reading nutritional value information with nutritional status.

Variable	Nutritional Status (IMT/U)		Total	P	OR (95% CI)
	Overweight n (%)	Not Overweight n (%)			
Sugar-Sweetened Beverages					
Excessive	11 (44)	14 (56)	25 (100)	0,005	5,343
Sufficient	5 (12,8)	34 (87,2)	39 (100)		(1,567-18,220)
Knowledge of Nutritional Value Information					
Less	6 (20,7)	23 (79,3)	29 (100)	0,469	0,652
Good	10 (28,6)	25 (71,4)	35 (100)		(0,204-2,080)
Habit of Reading Nutritional Value Information					
Less	8 (19)	34 (81)	42 (100)	0,129	0,412
Good	8 (36,4)	14 (63,6)	22 (100)		(0,129-1,315)

3.2.1 Relationship between Consumption of Sugar Sweetened Beverages with Nutritional Status

Based on Table 3, the nutritional status is divided into 2 categories. The more nutritional status includes overweight and obesity, while the less nutritional status includes thinness and normal nutrition. The bivariate analysis results using the chi-square test show a significant relationship between the consumption of sugar-sweetened beverages and the nutritional status of adolescents at SMK Fadilah, South Tangerang. Respondents who had more nutritional status were found in respondents with excessive sugar intake, namely more than 50 grams/day in sugar-sweetened beverages (44%), compared to respondents who consumed sufficient sweetened beverages (12.8%). Based on the results of statistical tests using the chi-square test, where p = 0.005 (<0.05), it can be concluded that there is a significant relationship between the consumption of sugar-sweetened beverages and the nutritional status of students at SMK Fadilah, South Tangerang.

The results of the analysis show that the OR value is 5.343. The OR results mean that respondents who consume sugar-sweetened beverages have more chances 5 times to have more nutritional status than those who consume moderately sweetened beverages.

3.2.2 Relationship between Knowledge Nutritional Value Information with Nutritional Status

Based on Table 3, it was found that respondents with nutritional status were more found to respondents with good nutritional value information knowledge (28.6%) compared to respondents with less nutritional value information knowledge (20.7%). However, the difference in these proportions could be

more significant. Based on the results of statistical tests using the chi-square test, where p = 0.469 (> 0.05), it can be concluded that there is no significant relationship between knowledge of nutritional value information with nutritional status of students at SMK Fadilah, South Tangerang.

3.2.3 Relationship between Habits of Reading Nutritional Value Information with Nutritional Status

Based on Table 3, it was found that respondents with more nutritional status were found more respondents with good nutritional value reading habits (36.4%) compared to respondents with less nutritional value reading habits (19%). Based on the results of statistical tests using the chi-square test, where p = 0.129 (> 0.05), so it can be concluded that there is no significant relationship between the habit of reading nutritional value information with the nutritional status of students at SMK Fadilah, South Tangerang.

4 DISCUSSIONS

Sugar-sweetened beverages are all beverage products with added sugar, namely sweet juice drinks, soda, sports drinks, energy drinks, sweet tea and coffee drinks. (Clifford & Maloney, 2016). The average intake of sugar in this study from sugar-sweetened beverages was 37.67 grams/day when compared to the consumption limit for sugar intake according to Permenkes No. 30 of 2013, which is 50 grams/person/day or can be said to be equivalent to 4 tablespoons (Kemenkes RI, 2013b). The average sugar intake consumed by respondents in sweetened drinks already exceeds half of the recommended sugar intake in a day.

From the interview results, it was found that the types of sugar-sweetened beverages consumed the most and the drinks consumed the least were milk (90.63%), tea (87.5%), coffee (60.9%), soft drinks (53.13%), bubble (18.75%), and syrup (4.7%). The results of this study indicate that respondents consider milk to be a good drink for consumption and healthy, so they are happier and prefer to consume milk. Based on (Philipsborn et al., 2019), Milk-sweetened beverages are made from milk-based ingredients with caloric sweeteners. One of the dairy products sold in Indonesia, in one 200 ml bottle of chocolate flavored milk, contains 22 grams of sugar. The results of this study are in line with the research of adolescents in Malaysia by Ahmad et al. (2019) that the reason for the high interest in consuming milk is due to ignorance of the high sugar content of these drinks because packaged milk drinks contain quite high sugar content with an average of 28 grams.

Sugar which is also known as sucrose, is a disaccharide consisting of monosaccharides, namely glucose, and fructose. Glucose serves as the primary energy source from the results of carbohydrate metabolism. Excess glucose will be formed into glycogen stored in the liver and muscles for energy reserves. Excess glycogen in the body will cause weight gain in a person (Saidah et al., 2017; Stanhope, 2016).

Fructose metabolism occurs in the liver. In this mechanism, the first enzyme to play a role, the fructokinase enzyme, converts fructose into fructose 1 phosphate. Then fructose 1 phosphate is converted to dihydroxyacetone phosphate and glyceraldehyde to form glyceraldehyde 3 phosphate. Then glyceraldehyde 3 phosphate is assisted by pyruvate kinase to form pyruvate. Then pyruvate is processed by the Kreb cycle to be converted to acyl CoA. Next, glyceraldehyde is processed by glycerol dehydrogenase to form glycerol. The enzyme glycerol kinase then follows it up to form glycerol 3 phosphate. Acyl CoA and Glycerol 3 phosphate can form triglycerides. Excess triglycerides stored in the body for a long time can risk having non-alcoholic fatty liver disease (NAFLD) and obesity (Hannou et al., 2018; Stricker et al., 2021).

Based on SQ-FFQ interviews in the past month, respondents who had a habit of consuming excess sugar-sweetened beverages (39.1%) consumed ready-to-drink drinks almost daily (60%). Respondents have a habit of consuming sweetened drinks because access to sweetened drinks is effortless for respondents to reach. In the Fadilah Vocational School environment, getting bottled drinks from mini markets or stalls is easy. Apart from that, several sweetened drinks are provided by the canteen in the school, such as packaged tea, packaged milk, and soft drinks.

This research aligns with Saidah et al (2017), showing a significant relationship between the consumption of sugar-sweetened beverages and the incidence of overweight in adolescents at SMA Institut Indonesia Semarang. This study proved that adolescents with nutritional events were found in respondents who had a habit of always consuming sweetened drinks (27.3%) than respondents who often consumed deeply sweetened drinks (11.8%).

The research shows that respondents who consume sweetened drinks are more likely to have high pocket money (52.33%) and consume sweetened drinks daily. Adolescents who consume more sugar-

sweetened beverages can be at risk of experiencing more nutrition. Energy from sugar-sweetened beverages in liquid form cannot make a person feel full when consuming food in solid form, so that person tends to feel hungry and makes a person's consumption excessive, which will have an impact on excess energy intake and increase fat in the body (Annisa et al., 2020).

Consuming excess sugar will become a habit that takes time to break. This habit is because sugar intake reduces stress activity in brain tissue, namely the Hypothalamus Pituitary Adrenal (HPA), and reduces stress on Corticotropin Releasing Hormone (CRH). Excessive sugar intake will also release opioids into the Nucleus Accumbens (NAc), a desired mechanism to consume excessively to restore homeostatic dopamine levels and avoid mild depression (Jacques et al., 2019; Tryon et al., 2015). Consuming excess sugar will accumulate in fat cells in the body resulting in overweight or obesity. The increased accumulation of fat cells will result in insulin resistance so that blood glucose levels increase. This insulin resistance will impact the risk of type 2 diabetes mellitus (Calcaterra et al., 2023).

Knowledge of information related to good or insufficient nutritional value plays a role in individual behavior in choosing the type of food (Florence Grace, 2017). The nutritional value information contains the number of servings of the packaging, which is the number of servings contained in one package. The nutritional value information on the package lists the nutrients listed in standard 1 portions (BPOM, 2019). In this study, respondents needed to learn the results of total energy or other nutrients if there were 2 or more servings in one package. It is proven that the knowledge with the fewest correct answers and the most unknown by respondents is 10 people (15.63%). Statement item C.09 states, “Pada gambar diatas, Jika produk A memiliki jumlah 2 sajian perkemasan, maka jumlah protein dalam satu kemasan sebanyak 14 g”.

This research is in line with Telisa et al (2020), which stated that there is no significant relationship between knowledge of nutrition and the incidence of obesity in adolescents. This result is due to adolescents who are obese or not obese having less knowledge of nutrition. The effect of obesity in adulthood can be avoided if teenagers know the importance of knowledge about food choices (Xu & Xue, 2016).

Nutritional information on food or beverage labels is an important source of information, but consumers need to utilize this. The correlation of nutritional knowledge with nutritional behavior can help develop a healthy lifestyle that can be carried into adulthood. An individual who already knows a lot about nutrition will also behave well in terms of nutrition (Chung & Fong, 2018). This theory is supported by research by Nurdzulqaidah et al (2017), which shows a relationship between knowledge and nutritional behavior. This result is because people who know the importance of nutritional content and its health benefits can influence changes in nutritional behavior.

The habit of reading nutritional value information labels in adolescents is mainly still classified as very less (65.6%) because respondents do not know knowledge about calculating nutrients on nutritional value information labels. Respondents pay more attention to prices, products, brands, expiration, and halal logos. This study's results align with the research of Arumsari et al (2022), which shows that teenagers rarely read and pay attention to food labels. Teenagers often pay attention to the brand on the packaging, packaging quality, price, taste, and expiration date. However, on the halal logo, teenagers only check when buying imported products but rarely check the halal logo on products from Indonesia because they feel safe and feel that most of Indonesia is predominantly Muslim.

This research is in line with Fitri et al (2020) that there is no significant relationship between the habit of reading nutritional value information and the nutritional status of adolescents. These results prove that almost half of adolescents (45.5%) need to read the nutritional value information labels.

The lack of information and knowledge regarding nutritional value information at Fadilah Vocational School makes the habit of reading nutritional value information lacking. The results of this study are supported by research (Ikrima et al., 2023) which shows a significant relationship between exposure to information media, the level of knowledge of nutritional value information, on the habit of reading nutritional value information. The habit of reading nutritional value information labels is not a direct factor that affects nutritional status, but these habits have a role in determining a person's nutritional status (Fitri et al., 2020).

5 CONCLUSIONS

In this study, most of the adolescents at Fadilah Vocational High School, South Tangerang, consumed moderately sugar-sweetened beverages (60.9%), had sufficient knowledge (46.9%), and had

a habit of reading information on nutritional values that were less (65.6%).

Based on the results of the study, it was found that there was a significant relationship between the consumption of sugar-sweetened beverages with nutritional status. However, there is no significant relationship between knowledge and habit of reading nutritional value information and nutritional status.

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Relationship of Breakfast Habits and Other Factors with the Incident of Overnutrition at SMA Permata Insani Islamic School

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Keywords: Added Sugar Intake, Breakfast Habits, Fast Food Intake, Overnutrition.

Abstract: This research examines the factors that influence overnutrition among adolescents aged 16 to 18 years.. This study aims to determine relationship between breakfast habits, sedentary activity, intake of added sugar and fast food with overnutrition in high school students Perrmata Insani Islamic School. Method in this study uses Cross Sectional method. Characteristics of respondents were obtained through questionnaire interviews. Added sugar intake and fast food intake were obtained by 2x24 hour food recall interviews and SQ – FFQ. Breakfast habits were obtained from questionnaire interviews. Sedentary activity was obtained through the Adolescent Sedentary Activity Questionnaire (ASAQ), nutritional status was obtained by means of anthropometric measurements taking into account BMI/A compared to the Z-Score. Respondents of this study were 114, it was found that 29.8% of respondents were overnutrition. 53.5% of respondents rarely have breakfast. All respondents did sedentary activities ≥4 hours. The average energy contribution of respondents who consumed added sugar and fast food was 274.3 Kcal and 319.5 Kcal respectively. Respondents who experienced overnutrition were 34 students and 25 of them rarely had breakfast. Overnutrition respondents had an average energy contribution from added sugar and fast food intake that was greater than non-overnutrition respondents. Education needs to be done in schools regarding factors that can influence the occurrence of excess nutrition such as breakfast habits, intake of added sugar and intake of fast food.

1 INTRODUCTION

Adolescence is a transition from childhood to adulthood which has signs including cognitive, biological and social changes. Adolescence occurs from the age of 12 years to 21 years. Adolescence has three levels, namely the initial stage at 12-15 years is said to be early adolescence, the second stage at 15-18 years is said to be mid-adolescence and the third level at 18-21 years is said to be late adolescence (Nurvita & Handayani, 2018). Many nutritional problems occur in adolescents, one of which is the most experienced by adolescents is overnutrition (Utami et al., 2018).

Overnutrition will lead to high risks in adulthood and can lead to increased morbidity and mortality in adulthood (Utami et al., 2018). Overnutrition can cause serious health problems and can affect emotional and social problems (Mardhiati & Setiawan, 2017). The impact of overnutrition is that it can cause hypertension and increased cholesterol levels which can cause coronary heart disease, stroke, gallbladder disease and cancer (Praditasari & Sumarmi, 2018). The nutritional status of adolescents can be determined through BMI/A (Kemenkes, 2020).

A teenager aged 16-18 years is said to be overweight if BMI/A > +1 SD (Kemenkes, 2020). In 2015 around 2.3 billion adolescents aged over 15 years were overweight and 700 million more of that number were obese. In Southeast Asia, the prevalence of overweight is 14% and obesity is 3% (Hafid & Hanapi, 2019). The prevalence of overnutrition in Indonesian adolescents aged 16-18 years in 2018 was 13.5% (Kemenkes, 2018b). In accordance with the results of the National Basic Health Research in 2018, adolescents who experienced overnutrition in Banten aged 16-18 were 13.29%. In Tangerang Regency the prevalence is 14.09% (Riskesdas, 2018). Adolescents who experience overnutrition in Tangerang Regency have a higher prevalence than Banten Province and Indonesia in 2018. Many factors cause high excess nutrition in Tangerang Regency.

One of the factors that can cause overnutrition is energy expenditure that is disproportionate to what is consumed, influenced by diet, lifestyle, parental history, environmental and biological factors (Praditasari & Sumarmi, 2018). If the energy consumed is greater than needed, it causes overweight or overnutrition (Fitriani et al., 2020). Excess energy can be caused by eating too much food that comes from carbohydrates, fats or protein. Excess energy will be processed in the body into fat and stored as fat, so if left unchecked it can result in overnutrition (Lapusu & Paramita, 2019). One of the factors that influence excess nutrition is breakfast (Rosida & Adi, 2017).

Breakfast is an activity in the form of eating and drinking which is done starting from waking up in the morning until 9 in the morning. Breakfast can provide 15-25% of the daily nutrition needed for a healthier, active and intelligent life (Puspitasari & Nissa, 2018). Adolescents who skip breakfast are 17 times more likely to be overweight and obese (Rosida & Adi, 2017). Based on the research conducted (Koca et al., 2017) to 7116 children aged 6-18 years, having breakfast only 1-3 times a week and never having breakfast was a greater percentage of those who were overweight and obese, namely 18.6% and 3.8%. When someone skips breakfast, it causes food consumption to tend to be more at lunch time. This affects the metabolism in the body which will slow down and be unable to burn excess calories. As a result of this causes accumulation and the occurrence of overnutrition (Mulyani et al., 2020). Lifestyle and activities are also causes that result in overnutrition (Putra, 2017).

Sedentary activity is a person's habits that do not meet the standard of physical activity in a day. Someone with sedentary habits does more activities that don't require a lot of energy. A person with sedentary activity ≥4 hours a day is 2.5 times more likely to have a risk of experiencing overnutrition (Putra, 2017). Research conducted in Indonesia showed that physical activity and a sedentary lifestyle had a 53.9% effect on overnutrition in adolescents (Al Rahmad, 2019). Food intake is also a factor in the occurrence of overnutrition, one of which is the intake of added sugar (Fatmawati, 2019)

Added sugar is sugar that is added to food during food processing. Excessive consumption of simple sugars has a risk of 5.7 times to become overnutrition (Fatmawati, 2019). Excessive intake of added sugar can lead to overnutrition. Indonesia's population of 53.1% has a habit of consuming sweet foods rather than fatty foods (Wiciyuhelma et al., 2021). Foods and drinks that are given added sugar have relatively high energy, so they can cause an increase in energy intake. An increase in energy that is not matched by physical activity can result in the formation of adipose tissue which can lead to overnutrition (Safitri & Rahayu, 2020). Intake of fast food is also one of the causes of overnutrition (Nisa et al., 2020).

Fast food that many are famous for Fast food

names contain high energy. Fast food is food that has a high energy and fat content and is low in fiber, so it can increase fat in the body (Rizky Putri et al., 2017). Students who have a habit of consuming fast food ≥4 times a week experience 72.5% of overnutrition. Students who eat fast food 1-3 times a week experience overnutrition by 15.9% (Nisa et al., 2020). Students who frequently consume fast food have a 2.74 times greater risk of suffering from overnutrition than students who rarely consume fast food (Hafid & Hanapi, 2019). Preliminary studies were conducted to determine whether there are students who experience overnutrition.

The results of a preliminary study conducted at the SMA Permata Insani Islamic School with 20 students aged 16-18 years showed that as many as 30% of students were obese, 20% of students were overweight, 45% of students had normal nutritional status and 5% of students were malnourished. This prompted researchers to conduct research related to the relationship between breakfast habits, sedentary activity, intake of added sugar and fast food for students aged 16-18 years and the incidence of overnutrition at SMA Permata Insani Islamic School. The location was chosen because the location of the school is close to food courts, shops that sell food, cinemas and fast food restaurants.

2 METHOD

This research uses a descriptive approach with a cross sectional study. Sampling in this study used the Probability Sampling method with the Random Sampling technique. The inclusion criteria in this study were Permata Insani Islamic School high school students aged 16-18 years, able to communicate well both physically and spiritually (not sick, not disabled, not able to use a cane or wheelchair). The exclusion criteria for this study were Permata Insani Islamic School high school students who refused or were not willing to participate and withdrew during the research process. The number of samples in this study was calculated using the sample calculation formula to test the 2 proportion hypothesis based on the Lameshow formula. Obtained the number of samples required for this study as many as 52 students. The minimum sample is multiplied by 2 to get 104 results. Anticipating the drop out, there is an additional sample of 10% so that the results obtained are 114.4, so the sample size is 114 students. This research will be conducted at SMA Plus Permata Insani Islamic School, Pasarkemis, Tangerang Regency, Banten on 24 – 29 October 2022

The data collection procedure in this research is that first the researcher carries out a preliminary study to see a picture of the research location. After that, the researcher prepares all the instruments that will be used in the research. Researchers coordinated with the principal and teachers at SMA Permata Insani Islamic School before collecting data. This research was assisted by enumerators, so it is necessary to hold discussions to equalize perceptions with the enumerators who assisted during the research before data collection. Next, when collecting data, researchers collected students who met the inclusion criteria and became the research sample. Before collecting data, the researcher introduced himself, explained the purpose of the research to respondents and filled out a consent form to become a respondent. After that, the researchers conducted characteristic interviews, breakfast habits interviews, 2x24 hour recall interviews, SQ – FFQ interviews and asked respondents to fill out a sedentary activity questionnaire for 1 week. When collecting data, researchers invited respondents to ask if the statements submitted were not understandable or unclear. When all the necessary data has been collected, the researcher rechecks the questionnaire that has been answered and filled in by the respondent to avoid data errors. Finally, from the data that has been collected, the researcher calculates and processes it using data processing applications on the computer and concludes the results.

Data on the characteristics of the respondents were obtained through questionnaire interviews. The data contained in the questionnaire are name, age, class, gender, date of birth, address, telephone number, pocket money and parents' income. Respondents' ages were categorized into three, namely ages 16, 17 and 18 years. Gender is categorized as male and female. Pocket money is categorized into >Rp. 15,000 and ≤Rp. 15,000. parents' income is categorized as <Rp. 4,500,000 and ≥Rp. 4,500,000.

Nutritional status data was obtained from anthropometric measurements. Body weight is measured by digital scales. Height was measured microtoise. From the data of body weight and height obtained BMI. After that, the z-score of BMI/U is calculated and the standard deviation results are obtained. These results were categorized into two, namely if <+1 SD was said to be not overnutrition and if ≥+1 SD was said to be overnutrition.

Respondents' breakfast habits were obtained through a breakfast habit questionnaire. The results of breakfast habits are categorized into 2, namely rarely breakfast if breakfast <4 times a week and often breakfast if ≥4 times a week. From the results of the breakfast questionnaire, it was also found what foods were consumed to replace breakfast after 9 am and before 12 noon.

Sedentary activity was obtained from the Adolescent Sedentary Activity Questionnaire (ASAQ) for 1 week. In the questionnaire there are 11 kinds of sedentary activities. The duration of sedentary activities carried out is obtained from the results of calculating the average per day by converting to minutes first. The length of sedentary activity per week in minutes is divided by 7 and the result is converted back into hours.

Added sugar and fast food intake is the average energy contribution from added sugar intake and fast food intake in the last 1 month. Data was obtained using the SQ – FFQ form. From the form SQ – FFQ intake of added sugar and fast food, the average contribution of energy can be obtained. The recall data is used to obtain the average daily energy intake which is used to compare and obtain the percent contribution of energy from added sugar intake and fast food.

These data were subjected to bivariate tests. The variable to be tested using the Chi-Square test is breakfast habits. The significance used is $p \leq 0.05$. A relative risk (RR) test was also carried out to determine the possibility that respondents who rarely eat breakfast will experience overnutrition. Sendentiary activity variables were tested using an independent t-test with a significance of $p \leq 0.05$. While the variables of added sugar intake and fast food intake were tested using the Mann Whitney test with a significance of $p \leq 0.05$. Research permits and ethical approval were obtained from the Medical and Health Research Ethics Commission of Muhammadiyah University Prof. Dr. Hamka (KEPKK-UHAMKA) with letter number FL/B.06-008/01.0 dated 19 September 2022.

3 RESULTS AND DISCUSION

3.1 Univariat

3.1.1 Responden Characteristics

Table 1 : Description of Respondent's Characteristics.

Characteristics of Respondents		N	%
Age	16 years	8	33,3
	17 years	38	33,3
	18 years	8	33,3
Gender	Man	5	39,5
	Woman	9	60,5
Pocet Money	>Rp. 15.000	9	78,1
	≤Rp. 15.000	5	21,9
Parents Income	<Rp. 4.500.000	1	27,2
	≥Rp 4.500.000	3	72,8
Total		14	100%

Based on table 1 above, the description of the distribution of respondents aged 16 to 18 years is 33.3%. Based on gender, there were more female respondents (60.5%) than male respondents (39.5%). Based on the amount of pocket money, it was found that respondents who had pocket money >Rp. 15,000 (78.1%) more when compared to respondents who have pocket money ≤Rp. 15,000. Based on parents' income, 72.8% of respondents who have parents with income ≥Rp. 4,500,000.

The amount of pocket money that students have can be due to the fact that 72.8% of students have parents with income ≥Rp. 4,500,000. the amount of parental income has an influence on the amount of children's pocket money which can also affect the ease with which children buy food or snacks while at school. According to research Lidiawati et al (2020) Socioeconomic status and parental income can affect children's pocket money. Parents who have high incomes can give children large pocket money and children will easily buy the food they want. Pocket money can be an influence on the purchasing power of food which can also be affected by eating patterns that contain high fat and calories which can lead to overnutrition (Febriani, 2019). Apart from that, the school also sells a variety of sweetened drinks in the cafeteria and business units and the location of the school is also close to food courts and shops that sell a variety of fast food.

3.1.2 Overview of Nutritrional Status

Tabel 2 : Overview of Nutritional Status.

Variable		N	%
Nutritional Status	No Over Nutrition	80	70,2
	Over Nutrition	34	29,8

Based on table 2 above, the description of the distribution of overnutrition status of respondents, respondents with no overnutritional status were 70.2% more than respondents with overnutritional status (29.8%).

3.1.3 Description of Breakfast Habits

Table 3 : Description of Breakfast Habits.

Breakfast Habits	N	%
Skip Breakfast	8	7
Rarely Breakfast	53	46,5
Often Breakfast	53	46,5
Total	114	100%

Based on table 3 above, the description of the distribution of respondents' breakfast habits is that there are more respondents who have often breakfast habits and rarely breakfast respectively (46.5%) compared to 7% of respondents who skip breakfast. Skip breakfast and rarely having breakfast are categorized as rarely having breakfast because they have breakfast less than 4-7 times a week. The total number of respondents who rarely had breakfast was 61, including replacing breakfast with snacks after 9 a.m. and before lunch.

In this study, respondents who rarely ate breakfast tended to replace it with snacks at school after 9 a.m. and before lunch. The total number of respondents who rarely had breakfast was 61 respondents and 45 of them replaced breakfast with snacks after 9 a.m. and before lunch. Foods purchased to replace breakfast include bread, chicken rice, catfish rice, yellow rice, curry rice, dumplings, jasuke, kebabs, bento rice, boxed milk, basreng, takoyaki, chiki, lontong, batagor, jelly, meatballs, donuts, tomyam, biscuits, ketoprak, putri ayu cake, fried rice, beng – beng, wheat extract and fried foods (cireng, mayo risol, chocolate banana, fried tempeh, vegetable risol).

3.1.4 Description Sedentary Activity

Tabel 4 : Description Sedentary Activity.

	Mean ± SD (menit) / Day	Minimum – Maximum (menit) / Day
Sedentary Activity	685,9 ± 127,3	410 – 895

Based on table 4 above, the sedentary activity description of 114 respondents has an average value of 685.9 minutes ± 127.3. The average length of doing sedentary activities when converted into hours becomes 11 hours 26 minutes, the average length of respondents doing sedentary activities in a day. The minimum and maximum values are 410 – 895 minutes a day.

Based on the results of research on SMA Permata Insani Islamic School students, students with sedentary activities ≥4 hours/day can be said to be high when compared to research conducted at SMA Negeri 5 Surabaya on 157 students in 2017 getting results of 58.7% of students doing sedentary activities ≥4 hours/day (Putra, 2017). Of the 11 sedentary activities, there is an activity that takes the longest duration, namely using a gadget or computer for fun on Sundays with an average duration of 605 hours. After that, namely sitting relaxed activities, chatting in person or by phone on Friday with an average duration of 284 hours 30 minutes. next, namely the activity of using a computer or the internet to do homework on Monday with an average duration of 186 hours 17 minutes.

Sedentary activities tend to be carried out a lot because students spend a lot of time at school sitting studying and chatting with friends during free hours or breaks. When they come home from school and during holidays, many students spend their time tutoring, doing assignments or playing gadgets. However, schools also hold mandatory extracurricular activities that involve physical activity, namely pencak silat 2 times a week and scouts 1 time a week. In addition, once a week students get sports subjects. On average, students do a lot of sedentary activities such as playing mobile phones, watching TV, driving to school and using computers. The existence of this with the passage of time there will be many technological advances that can make it easier for humans, which causes an increase in sedentary activity, because this does not have a direct relationship with nutritional status (Susanti & Nurhayati, 2019).

3.1.5 Overview of Added Sugar Intake

Tabel 5 : Overview of Added Sugar Intake.

	Mean ± SD (Kkal) / Day	Minimum – Maximum (Kkal) / Day
Additional Sugar Intake	274,3 ± 202,1	17,30 – 1277,95

Based on table 5 above, the description of added sugar intake from 114 respondents has an average value of 274.3 Kcal ± 201.1. The average total energy intake from added sugars in a day is 13.45% of the adolescent AKE. This exceeds the AKE recommendation of added sugar in a day, which is 10% (Kemenkes, 2018a). This could be one of the causes of respondents experiencing overnutrition. Based on the results of the data, the 3 most frequently consumed drinks were milo, teh pucuk and bengbeng drink with an average energy of 30.94 Kcal, 29.33 Kcal and 23.18 Kcal respectively in a day.

The recommended daily sugar intake is 50 grams or the equivalent of 4 tablespoons. In 1 packet of milo contains 11 grams of sugar, so in one drink milo contributes 22% of sugar. Shoot tea in 1 pack contains 18 grams of sugar, so it contributes 36% sugar. Bengbeng drink 12 grams, it can contribute 24% of sugar.

53.1% of Indonesia's population has a habit of consuming sweet foods rather than fatty foods (Wiciyuhelma et al., 2021). Consumption of simple sugars has a 5.7 times risk for obesity (Fatmawati, 2019). Research conducted on 224 students at Notre Dame High School, West Jakarta, showed that 25% of students had excess added sugar intake (Luwito & Santoso, 2021). In this study, all high school students at Permata Insani Islamic School who were the respondents consumed sweetened drinks. The only difference is the frequency of drinking sweetened drinks and the number of variants of sweetened drinks consumed.

3.1.6 Overview of Fast Food Intake

Table 6 : Overview of Fast Food Intake.

	Mean ± SD (Kkal) / Day	Minimum – Maximum (Kkal) / Day
Fast Food Intake	319,5 ± 211,3	24,90 – 1092,50

Based on table 6 above, the description of fast food intake from 114 respondents has an average value of 319.5 Kcal ± 211.3. The average total intake of fast food in a day contributes 15.7% of the AKE in a day. Energy intake from fast food fats is high when compared to the recommended daily fat intake, which is 20-25% of the AKE (Kemenkes, 2018a). The most frequently consumed fast food is meatballs with an average energy of 84.86 Kcal per day. The second is nuggets with an average energy of 46.67 Kcal per day. The third is french fries with an average energy of 39.67 Kcal a day.

The recommended intake of fat in a day is 5 tablespoons or the equivalent of 67 grams. In 1 serving of meatballs contains 59.8 grams of fat, so in one meal the meatballs contribute as much as 89.2% fat. Consumption of nuggets in 100 grams (equivalent to 5 pieces of nuggets) contains as much as 20 grams of fat, so consumption contributes 29.8% fat. 100 grams of fried potatoes contain 14.1 grams of fat, so it can contribute as much as 21% fat.

In this study all high school students at Permata Insani Islamic School who were respondents consumed fast food. The only difference is the frequency of consuming fast food and the number of types of fast food consumed. The frequent consumption of fast food by respondents could be due to the location of the school which is close to food courts and shops selling various types of fast food.

3.1.7 Overview of Daily Energy Intake

Table 7 : Overview of Daily Energy Intake.

	Mean ± SD (Kkal) / Day	Minimum – Maximum (Kkal) / Day
Daily Energi Intake	2039,2 ± 419,4	1085,60 – 3873,20
Man	2180,27 ± 531,7	1085,60 – 3873,20
Women	1947,28 ± 295,9	1340,50 – 2662,75

Based on table 7 above, the total energy intake of 114 respondents has an average value of 2039.2 Kcal ± 419.4. The average total energy intake was also differentiated by gender, the results obtained for male respondents were 2180.27 ± 531.7 and the average total energy intake for women was 1947.28 ± 295.9. Based on this table, the daily energy adequacy figure for men is 2650 Kcal and women is 2100 Kcal. If we compare the total energy intake of 114 male and female respondents with the daily energy adequacy figure, the total energy intake is still below the energy adequacy figure.

3.2 Bivariat

3.2.1 Relationship Between Breakfast Habits and the Incidence of Overnitrition

Tabel 8 : Relationship Between Breakfast Habits and the Incidence of Overnutrition.

Breakfast Habits	Nutritional Status				Total		P Value	RR (minimum-maximum)
	Overnutrition		No Overnutrition					
	N	%	N	%	N	%		
Rarely Breakfast	25	21,9%	36	31,6%	61	53,5%	0,005	2,413 (1,239-4,703)
Breakfast Often	9	7,9%	44	38,6%	53	46,5%		

Based on table 8 above, it illustrates that respondents with overnutrition status are more likely to be found in respondents who have a habit of rarely having breakfast as much as 21.9% compared to respondents who have a habit of having breakfast often as much as 7.9%. Skip breakfast and rarely having breakfast are put into one category, namely rarely breakfast. Based on the results of the chi square test between breakfast habits and nutritional status, the P value is 0.005. This shows that the P-value <0.05 so that it can be said that there is a significant relationship between breakfast habits and overnutrition status in Permata Insani Islamic School high school students. The RR results are 2.413 with a minimum and maximum value of 1.239 – 4.703. It can be interpreted that respondents who rarely have breakfast have a 2.413 times greater chance of experiencing overnutrition than respondents who often have breakfast.

Based on comparative data between respondents who rarely had breakfast and often had breakfast with a large difference, rarely had breakfast with a larger percentage of 21.9% and often had breakfast of 7.9%. This is in accordance with another study conducted on 34 students at SMAN 2 Tasikmalaya, which found a relationship between breakfast habits and overnutrition.(Lugina et al., 2021).

Breakfast is done to meet 15-25% of daily nutritional needs(Puspitasari & Nissa, 2018). Someone who rarely has breakfast has a greater tendency to eat snacks that contain fat and contain higher cholesterol than people who often have breakfast. This affects the incidence of overnutrition (Rosida & Adi, 2017). Breakfast is very important role in maintaining a good diet. When someone does not have breakfast, they have a tendency to over eat at lunch time. This affects the metabolism in the body which will slow down and the body does not have the ability to burn excess calories from lunch which can cause accumulation and occurrence of overnutrition (Mulyani et al., 2020).

3.2.2 Relationship Between Sedentary Activity and Overnutrition status

Table 9 : Relationship Between Sedentary Activity an Overnutrition Status.

Nutritional Status	N	Sedentary Activity		P value
		Mean (minute)	Standard Deviation	
No Overnutrition	80	691,11	122,143	0,507
Overnutrition	34	637,74	139,747	

Based on the results of table 9 above, it illustrates that 34 respondents experienced overnutrition and 80 respondents who were not overnutrition. Respondents who were not overnutrition tended to spend more time doing sedentary activities of 691.11 minutes compared to respondents who were overnourished by 637.74 minutes. If these results are converted into hours, the respondents who are not overnutritious carry out sedentary activities on average for 11 hours 52 minutes and respondents who experience overnutrition carry out sedentary activities for an average of 10 hours 38 minutes. Based on the results of the independent t-test between sedentary activity and overnutrition status, the P-value was 0.507. This shows that the P-value > 0.05 so that it can be said that there is no significant relationship between sedentary activity and overnutrition status in SMA Permata Insani Islamic School students. This is in accordance with another study conducted on class XI students at SMA Negri 1 Mojosari with 165 students as respondents, the results showed that there was no relationship between sedentary activity and overnutrition in adolescents due to the negative influence of

sedentary activity which increased, the nutritional status decreased (Susanti & Nurhayati, 2019).

Someone who has a sedentary lifestyle often ignores physical activity and tends to do activities that don't require much energy. Sedentary activity causes the body to become less mobile. This causes an imbalance between incoming energy and expended energy. When energy is not used the body will store it as fat and cause overnutrition (Al Rahmad, 2019).

3.2.3 Relationship Between Added Sugar Intake and the Incidence of Overnutrition

Tabel 10 : Relationship Between Added Sugar Intake and the Incidence of Overnutrition.

Nutritional Status	N	Added Sugar Intake		P value
		Mean (Kcal)	Min – Max	
No Overnutrition	80	210,83	17,30 – 771,40	<0,0001
Overnutrition	34	424,59	96,30 – 1277,95	

Based on table 10 above, it illustrates that 34 respondents experienced overnutrition and 80 respondents who were not overnutrition. The average energy from the respondents' added sugar intake was greater in respondents who experienced overnutrition, namely 424.59 Kcal compared to respondents who were not overnutritious, which was 210.83 Kcal. There is a comparison of the average difference which differs greatly from the average energy obtained from sugar intake in more and less overnutrition respondents. When compared with the RDA, the average energy from the intake of added sugar of respondents who are overnutritious in men contributes 16.02% and in women 20.22%. Based on the results of the Mann Whitney test between added sugar intake and overnutritional status, a P value <0.0001 was obtained. This shows that the P-value <0.05 so that it can be said that there is a significant relationship between intake of added sugar and overnutritional status in SMA Permata Insani Islamic School students. This is in accordance with another study conducted on 99 SMA students from the Indonesian Institute of Semarang, which found significant results between the consumption habits of sweetened drinks and the incidence of overnutrition. Adolescents who like to consume drinks containing sweeteners as much as 39.1% experience overnutrition (Saidah et al., 2017).

Consuming foods and drinks that contain excessive amounts of added sugar will trigger an increase in energy intake. An increase in energy that is not matched by physical activity can be a cause for the formation of adipose tissue which can lead to overnutrition (Safitri & Rahayu, 2020). The sugar that is usually mixed in a lot of sweetened drinks is sucrose type sugar. Sucrose is a simple sugar that includes carbohydrates in the disaccharide class, this sugar also consists of two monosaccharides, namely fructose and glucose. Glucose is more quickly absorbed by the body than fructose. Glucose in the body is used as energy. The body stores glucose in the form of glycogen which is useful for energy reserves which can increase the risk of overnutrition (Saidah et al., 2017).

3.2.4 Relationship Between Fast Food Intake and the Incindence of Overnutrition

Tabel 11 : Relationship Between Fast Food Intake and the Incidence of Overnutrition.

Nutritional Status	N	Fast Food Intake		P value
		Mean (Kcal)	Min – Max	
No Overnutrition	80	248,64	24,90 – 692,90	<0,0001
Overnutrition	34	486,17	106,10 – 1092,50	

Based on table 11 above, it illustrates that 34 respondents experienced overnutrition and 80 respondents who were not overnutrition. The average energy from the fast food intake of respondents was greater for respondents who experienced overnutrition, namely 486.17 Kcal and for respondents who were not overweight, 284.64 Kcal. Based on the average results, there is a large difference in comparison between the average energy intake from fast food for respondents who are overnutrition and not overnutrition. The average energy from fast food intake in male and female respondents who experienced overnutrition contributed as much as 18.35% and 23.15% of energy from AKE, respectively. Based on the results of the *Mann Whitney test* between fast food intake and overnutritional status, a P value <0.0001 was obtained. This shows that the P-value <0.05 so that it can be said that there is a significant relationship between fast food intake and overnutritional status in Permata Insani Islamic School high school students. This is in accordance with research conducted on Labschool Kebayoran Baru high school students

with a sample of 111 students who obtained significant results between fast food intake and overnutritional status (Handari & Loka, 2017).

Eating fast food with frequent intensity can interfere with health. One of the health problems caused is overnutrition, because fast food contains high calories and fat but low fiber, vitamin and mineral content (Harahap, 2021). Consumption of fast food is associated with increased fat stores in the body due to imbalance of energy intake and energy expenditure. The more frequent consumption of fast food can increase the risk of overnutrition (Rizky Putri et al., 2017).

4 CONCLUSION

Based on the results it can be concluded that respondents with overnutritional status were 34 respondents (29.8%). Respondents who rarely had breakfast were 61 respondents (53.5%). All respondents have sedentary activities ≥4 hours a day. The average contribution of energy from added sugar intake is 274.3 Kcal. The average contribution of energy from fast food intake is 319.5 Kcal. There is a significant relationship between breakfast habits, added sugar intake and fast food intake with the incidence of overnutrition with a P-value <0.05. As for the relationship between sedentary activity and the incidence of overnutrition, there is no significant relationship with a P-value of 0.507.

The strength of this research is that this research examines the title so that it can be used as a reference by readers and students, especially students at SMA Permata Insani Islamic School, to maintain normal nutritional conditions. This research has limitations, namely that in this study the researchers only analyzed respondents who often had breakfast or rarely had breakfast, and did not analyze the calorie content consumed from breakfast.

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AN OVERVIEW OF BLOOD PRESSURE EXAMINATION IN HYPERTENSIVE PATIENTS IN PERIGI BARU 2023

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Keywords: Hypertension, blood pressure check, awareness

Abstract: Introduction: Hypertension in Perigi Baru ranks as the most prevalent disease according to data from the Parigi Health Center in 2022. Regular blood pressure checks play a crucial role in early detection and management of hypertension. Despite its significance, there is a lack of high awareness among individuals regarding consistent blood pressure monitoring. Objectives of the study: This study aims to depict the prevalence of blood pressure monitoring in hypertensive patients within Perigi Baru and enhance public awareness, particularly among those with hypertension, about the importance of routine blood pressure assessments. Method: A cross-sectional study. Population: The target population consists of individuals with hypertension in Perigi Baru. Sample: A sample size of 50 respondents was selected using the Accidental Sampling technique. Data collection involved the utilization of questionnaires, with subsequent data analysis employing descriptive methods. Results: Among respondents with hypertension in Perigi Baru, 33 (66%) adhere to routine blood pressure checks, while 17 (34%) respondents undertake such assessments intermittently. Conclusion: In general, respondents demonstrate an awareness of the significance of regular blood pressure monitoring. However, it is noteworthy that 34% of respondents remain unaware of the necessity of consistent blood pressure checks. To address this, interventions such as counseling sessions and the implementation of routine blood pressure assessments in various regions through the Parigi Health Center are recommended to heighten respondents' awareness.

1 INTRODUCTION

As a potentially perilous ailment often referred to as the "Silent Killer," hypertension, commonly known as high blood pressure, warrants universal concern. Hypertension can strike unsuspecting individuals without manifesting any discernible symptoms. Essentially, hypertension signifies a condition where the systolic blood pressure in the body reaches or surpasses 140 mmHg, coupled with a diastolic blood pressure equal to or exceeding 90 mmHg (UPK Kemenkes RI, 2022).

According to data from the World Health Organization (WHO) in 2015, roughly 1.13 billion individuals worldwide are afflicted with hypertension, indicating that one out of every three people globally receives a hypertension diagnosis. The tally of hypertension cases escalates annually, with projections indicating that by 2025, there will be 1.5 billion hypertension sufferers. Tragically, an estimated 9.4 million individuals will succumb each year due to complications arising from high blood pressure (Kemenkes RI, 2019).

The World Health Organization (WHO) approximates that hypertension's global prevalence rests at 22% of the world's population. The most notable incidence of hypertension is in Africa, where prevalence reaches 27%. Southeast Asia ranks third highest, with a prevalence of 25% of the total population (Maulidah et al., 2022). Referring to the outcomes of the 2018 Basic Health Research (Riskesdas), hypertension's prevalence among individuals aged over 18 in Indonesia stood at 34.1% (Kemenkes RI, 2019). This prevalence is ascertained through blood pressure measurements exceeding 140/90 mmHg. Notably, this incidence rate surpasses the 2013 figure of 25.8%. South Kalimantan province exhibits the highest incidence rate at 44.13%, trailed by West Java at 39.6%, and East Kalimantan at 39.3% (Maulidah et al., 2022).

Regularly monitoring blood pressure in individuals with hypertension is of paramount

significance due to its status as a primary risk factor for hypertension-related complications and heart attacks. Individuals with a susceptibility to high blood pressure are advised to meticulously maintain their blood pressure levels and undergo consistent blood pressure checks (P2PTM Kemenkes RI, 2022).

In 2022, hypertension emerges as the most prevalent malady in Perigi Baru, as indicated by data from Puskesmas. However, the community currently exhibits inadequate awareness concerning the importance of routine blood pressure assessments.

2 OBJECTIVES OF THE STUDY

The objective is to describe the habit of checking blood pressure in hypertensive patients in Perigi Baru.

3 METHODS

The research employed a quantitative approach, utilizing a cross-sectional study design. The purpose of this study was to characterize the blood pressure monitoring practices among hypertensive patients residing in Perigi Baru Village. The collection of primary data involved field observations coupled with interview questionnaires and blood pressure assessments of the respondents.

For primary data collection, interview questionnaires were distributed to the target population, consisting of hypertensive patients within Perigi Baru Village. The study sample comprised 50 individuals, selected through an accidental sampling technique. Subsequently, the collected data underwent descriptive analysis for processing.

4 RESULTS

4.1 Respondent Characteristics

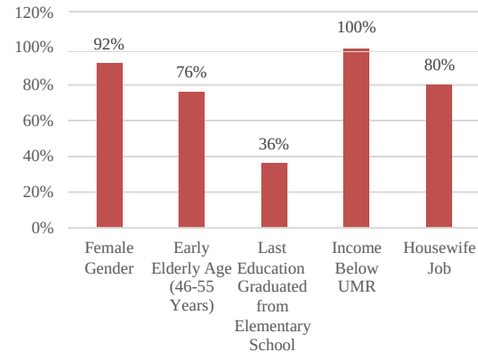

Figure 1: Characteristics of Hypertensive Respondents in Perigi Baru Village, 2023.

Figure 1 depicts the characteristics of the respondents, revealing that in the year 2023, the majority of individuals with hypertension in Perigi Baru Village were female, accounting for 46 individuals (92%). Among the respondents, 38 individuals (76%) fell within the age range of 46-55 years. Additionally, 18 respondents (36%) had completed their education at the elementary school level. Notably, all 50 respondents (100%) reported an income below the Tangerang Regional Minimum Wage. Furthermore, a significant portion of respondents, comprising 40 individuals (80%), held the occupation of housewives.

4.2 High Blood Pressure

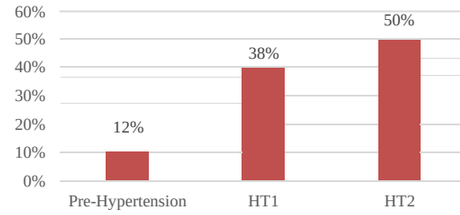

Figure 2: Distribution of Hypertension Respondents Based on High Blood Pressure.

Figure 2 illustrates the quantity of respondents afflicted with hypertension in Perigi Baru, categorized based on the hypertension classification outlined by the Ministry of Health of the Republic of Indonesia. Among the respondents, the highest occurrence was in the HT2 (>160/>100) category, with 25 individuals (50%) falling into this range. Conversely, the lowest prevalence was observed in the prehypertension range (120-139/80-89), encompassing 6 respondents (12%).

4.3 Blood Pressure Examination

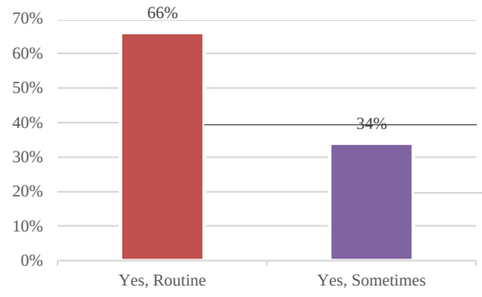

Figure 3: Distribution of Hypertension Respondents Based on Blood Pressure Examination.

Figure 3 reveals the frequency of blood pressure examinations among respondents in Perigi Baru Village who are afflicted with hypertension. The majority, comprising 33 respondents (66%), engage in regular blood pressure checks. Conversely, a smaller proportion, encompassing 17 respondents (34%), occasionally conduct blood pressure assessments.

5 DISCUSSION

5.1 Routine Health Checks

Routine health examinations serve as both primary and secondary prevention strategies, enabling the early detection of disease complications. Moreover, these examinations aid individuals in identifying appropriate preventive measures. Survey findings within Perigi Baru Village indicate that 66% of respondents, totaling 33 individuals, consistently monitor their blood pressure. In contrast, 34% of respondents (17 individuals) do not adhere to regular blood pressure checks. When juxtaposed with a similar study by Idrus et al. (2021), noteworthy variations arise. Their research unveils that 59.4% of respondents possessing higher knowledge levels engage in routine blood pressure checks, while 92.5% of those with lower knowledge levels forego such assessments.

Considering the total respondent count of 50 individuals, the outcomes showcase that 66% (33 respondents) diligently monitor their blood pressure. The remaining 34% (17 respondents) deviate from regular checks. This observation highlights a larger portion of respondents who consistently monitor their blood pressure compared to those who do not.

Consequently, the 66% figure is substantial within this study, signifying a commendable level of awareness among hypertensive patients in Perigi Baru Village regarding blood pressure monitoring.

6 CONCLUSIONS

Hypertension is characterized by a systolic blood pressure equal to or exceeding 140 mmHg, accompanied by a diastolic blood pressure equal to or surpassing 90 mmHg. The occurrence of hypertension, also known as high blood pressure, arises from a combination of uncontrollable primary risk factors and modifiable minor risk factors in the Parigi Baru Region. Routine blood pressure assessments play a vital role in early detection, contributing to the prevention of hypertension. Nonetheless, fostering awareness within the community is imperative to promote consistent blood pressure checks.

Intervention efforts were executed within Perigi Baru Village, encompassing "PATUH" counseling sessions that employed clear, concise, and informative lecture methodologies to prevent hypertension. Additionally, the provision of a Hypertension Diary containing "PATUH" content was undertaken. Collectively, the outcomes of the intervention affirm that respondents already possess an understanding of the significance of routine blood pressure checks. However, there remains a need to enhance the awareness of the importance of regular blood pressure monitoring, as evidenced by the 34% of respondents who have yet to fully grasp this necessity.

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APPENDIX

THE RELATIONSHIP BETWEEN BREAKFAST HABITS WITH COGNITIVE ABILITIES IN 5TH-GRADE STUDENTS IN EAST JAKARTA

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Keywords: Breakfast Habits, Cognitive Ability, Nutritional Status.

Abstract: Background: Many people in Indonesia still do not eat breakfast, and most of those who eat breakfast have a low-quality breakfast. Objective: To determine the relationship between breakfast habits with cognitive abilities and nutritional status in 5th-grade elementary school students in East Jakarta Methods: Parallel mixed method research design with a cross-sectional approach. The study population was SDN Pekayon 05 and SDN Kalisari 05, East Jakarta, Pasar Rebo sub-district, involving 106 students selected using a stratified random sampling technique. Quantitative data analysis techniques used the Fisher Exact test to determine the relationship between breakfast habits with cognitive abilities and nutritional status, while qualitative data analysis used thematic analysis. Results: There is a relationship between breakfast habits and cognitive abilities on short-term memory (p=0.004), and no relationship between breakfast habits and cognitive abilities on learning achievement and nutritional status. It was found that the motivating factor for breakfast was the menu provided, and the inhibiting factor for breakfast was waking up late before going to school. Conclusion: There is a significant relationship between breakfast habits with cognitive abilities in short-term memory and factors of student breakfast habits from parents, schools, and menus provided.

1 INTRODUCTION

Children are a valuable demographic that requires special consideration. Substantial efforts aimed at improving children's well-being significantly contribute to the nation's sustainability. Children's quality of life can be improved by prioritizing their health, particularly ensuring their nutritional status is within standard or optimal parameters (Hartini Mardi Asih et al., 2017). The WHO explains that good nutrition is "the cornerstone of good health." Growing children need proper and balanced food and nutrition to grow well. School-age children are usually more active, so they need good nutrition. If school-age children are well-nourished, their growth and mental progress will be improved (Soheilipour et al., 2019). The way to get good health and nutritional status is through breakfast. Breakfast is the main activity of eating and drinking, the most critical task for a person before doing activities. Breakfast is done when a person wakes up until 09.00 am. A good breakfast has 15-30% of the daily nutritional intake to build an active, healthy, and intelligent body (Octaviani et al., 2020).

The majority of people in Indonesia do not eat breakfast, and the majority of people who usually eat breakfast have low breakfast quality. Riskesdas data (2018) shows that 26% of Indonesian children only drink for breakfast. In the same data, only 10.6% have a nutritional adequacy level of 30% for breakfast. SDT data from the Indonesian Research and Development Agency (2020) shows that in Indonesia, 25,000 children aged 6 to 12 years, 47.7% of children do not meet their nutritional needs at breakfast, and 66.8% of children's breakfasts do not meet nutritional needs. Samsudin et al (2018) research on breakfast habits shows that 48.8% of children usually have breakfast, and 51.2% do not have breakfast in elementary school children in grades 3, 4, and 5 Ciracas East Jakarta. Children who do not eat breakfast have a risk of nutritional status and impaired cognitive abilities, obesity, impaired concentration, metabolic syndrome, and astemia (Hartini Mardi Asih et al., 2017).

Cognitive ability is the ability to think and reason in the learning process, the level of memory, orientation, perception, and attention; cognitive ability can be measured through aspects of learning achievement and short-term memory. Breakfast is a source of initial energy, and glucose is very influential on the mechanism of a person's cognitive function (ability to remember), which is used as fuel in the brain (Khalida, 2015). If a person's breakfast intake during childhood is insufficient, cognitive decline occurs over a long period. Breakfast can increase social interaction with family, which significantly affects a person's cognitive abilities (Liu et al., 2021). Based on the results of research by Khalida (2015) and (Aryadi et al., 2019) on elementary school students in Denpasar City, there is a relationship between breakfast habits and student memory levels. Skipping breakfast can also affect children's learning achievement; the results of research by Hoata et al (2021) at SD Kartika VII-1 show that students with good breakfast habits have a 2.176 higher chance of getting good achievement than students with poor breakfast habits. Lasidi et al., (2018) research at SDN 21 Manado also showed a relationship between students with good breakfast and learning achievement. Concentration is influenced by the energy intake obtained from breakfast and its nutritional content (Verdiana & Muniroh, 2018). Carbohydrates obtained at breakfast function to stimulate glucose and other micronutrients that can produce energy. So that it can spur the brain so that it is easy to focus on learning and absorb lessons (Hanif, 2016).

However, some barriers and drivers cause school-age children to skip breakfast. Children who do not eat breakfast exhibit unhealthy daily intake, such as excessive intake of a single meal, which may contribute to an increased susceptibility to overweight and increased BMI (Body Mass Index) (Aryadi et al., 2019). Children's nutritional status is an indicator of the level of success in implementing a balanced diet. It is determined based on the child's weight and height. Nutritional status can also be seen as an illustration of the extent to which nutritional needs are met (Sufyan et al., 2020). Riskesdas data (2018) shows that the nutritional status (BMI/A) of children aged 5 to 12 years is very thin 2.4%, thin 6.8%, fat 10.8% and obesity 9.2%. Riskesdas data (2018) nutritional status (BMI/A) at the age of 5 to 12 years according to the city of East Jakarta there are 1.84% having a fragile nutritional status, 7% thin, 15.46% fat, and 15.36% obese. Research by Sa'adah et al (2014) revealed a significant correlation between the prevalence of stunting and student academic achievement at SDN 01 Guguk Malintang, Padang Panjang City. The findings show that children who suffer from malnutrition tend to achieve less than optimal school performance.

Despite the vital role of breakfast, many schoolchildren need to eat breakfast regularly. Previous studies have found that knowledge and attitudes about breakfast influence breakfast habits. However, other studies have yet to determine the crucial factors in improving breakfast habits that can

complement information for designing breakfast habit programs through schools (Dhanti et al., 2022). In the results of initial observations conducted by researchers by interviewing the 5th-grade homeroom teacher at SDN Pekayon 05 Pagi East Jakarta, those who are accustomed to breakfast are only around 7.4%. In contrast, the rest are not accustomed to breakfast. From the existing problems, researchers are interested in conducting a study entitled The Relationship between Breakfast Habits with Cognitive Ability and Nutritional Status and Encouraging and Inhibiting Factors in 5th Grade Elementary Students in East Jakarta.

2 METHODS

This study used a parallel mixed method design with a Cross-Sectional approach. This method was conducted to obtain the relationship of breakfast habits with cognitive abilities and nutritional status and inhibiting and encouraging factors for breakfast habits in 5th-grade elementary school students in East Jakarta. The research was conducted in March-April 2023 at SDN Pekayon 05 Pagi and SDN Kalisari 05 Pagi East Jakarta, Pasar Rebo District. In contrast, the independent variables were cognitive abilities, namely learning achievement, using the average semester report card scores and short-term memory with the digit span test and nutritional status measured by weight and height directly and attached to the questionnaire.

The selection of schools is based on the results of preliminary study observations and the number of class samples taken using stratified random sampling. The population in this study was 5th-grade elementary school students in the East Jakarta Pasar Rebo sub-district. In quantitative research, as many as 106 students with a minimum sample size of 99 5th-grade students calculated using the Slovin formula if the population size (N) is known as and in qualitative research, there were 12 subjects by interviewing each school representative to 5th-grade students, parents, and guardians. The samples studied in this study met the inclusion and exclusion criteria.

Data collection techniques using interviews and measurements of weight and height. In comparison, the analysis used is univariate, bivariate, and thematic. Univariate data analysis was conducted to determine the characteristics of the subjects studied, including age, description of breakfast habits, description of learning achievement, description of short-term memory, and description of nutritional status.

The test used Chi-Square Fisher Excact with an $\alpha = 0.05$ value. Presentation of data using tables by looking at the p-value to see the significance of the relationship. Qualitative analysis was conducted using thematic analysis with the help of Microsoft Excel to obtain information about the encouraging and inhibitor factors of breakfast habits of school children in East Jakarta Elementary School.

3 RESULTS AND DISCUSION

3.1 Univariat Analysis

Table 1: Univariat Analysis.

Characteristics	Frequency	Presentage (%)
Age		
11	87	82,2
12	17	16
13	1	0,9
14	1	0,9
Breakfast Habits		
Often	62	58,5
Rarely	38	35,8
Never	6	5,7
Learning Achievement		
Adequate	0	0
Good	99	93,4
Excellent	7	6,6
Short-term Memory Test		
Missing	1	0,9
Adequate	97	91,5
Good	8	7,5
Nutritional Status		
Undernutrition	3	2,8
Normal	65	61,3
Overnutrition	21	19,8
Obesity	17	16
TOTAL	106	100

The age characteristics of the majority of respondents aged 11 years were 87 students (82.2%), the majority

of students (58,5%) often have breakfast (> 4 days during the week) in the morning before going to school, the majority of students (93,4%) have good achievement learning, 91.5% have adequate memory test scores. Beside that, based on Table 1, the majority of students have good nutritional status (61.3%).

3.2 Bivariat Analysis

Table 2: Bivariat Analysis.

Variable	Breakfast Habits						p-value
	Often		Rarely		Never		
	n	%	n	%	n	%	
Learning Achievement							
Adequate	0	0	0	0	0	0	0,506
Good	58	55	36	34	5	4,7	
Excellent	4	3,8	2	1,9	1	0,9	
Short-term Memory Test							
Missing	0	0	0	0	1	0,9	0,004
Adequate	55	52	38	36	4	3,8	
Good	7	6,6	0	0	1	0,9	
Nutritional Status							
Undernutrition	1	0,9	2	1,8	0	0	0,386
Normal	35	33	25	24	5	4,7	
Overnutrition	12	11	8	7,5	1	0,9	
Obesity	14	13	3	2,8	0	0	

Based on the data in Table 2 shows the results of the analysis of the relationship between breakfast habits with cognitive abilities on learning achievement. There is one person (0.9%) with outstanding learning achievement but never had breakfast during the last week. While students who have good learning achievement but rarely do breakfast (<4 times a week), there are 36 people (33.9%). The statistical tests of this study indicate no relationship between breakfast habits and cognitive abilities in student learning achievement.

However, several theories state that what affects children's learning achievement is that there are internal factors, which are factors that concern the child's self both from his physical and psychological or mental conditions. These internal or intrinsic factors include physiological and psychological conditions, including children's interests and talents, intelligence, and motivation. While external factors are motivating factors from the surrounding environment, external or extrinsic factors are everything that comes from outside a person that can affect their learning achievement.

The analysis of the relationship between breakfast habits and cognitive abilities on the short-term memory test shows that one student (0.9%) had good short-term memory test results in the last week who never had breakfast. Fifty-five students (51.9%) have had short-term memory test results quite often do breakfast in the last week. The statistical test results of this study showed p=0.004, so it can be concluded that H1 is accepted; there is a relationship between breakfast habits and cognitive abilities on short-term memory tests in 5th-grade elementary school students in East Jakarta.

This study aligns with the research of Kusumadewi et al. (2016) there is a very significant relationship between breakfast habits and short-term memory (p <0.001). In another study conducted by Aryadi et al. (2019), statistical test results (p-value = 0.008) indicate a significant relationship between breakfast habits and children's memory levels. Short-term memory increases in childhood. Besides that, breakfast affects children's cognitive function, so that children are more focused on classroom lessons. At a short duration, breakfast modulates metabolic responses by increasing glucose concentration to support the performance of the neurotransmission system to be more optimal. Breakfast is the initial intake, and as a source of glucose energy for the brain, glucose plays a role in a person's memory mechanism, so good nutritional intake will influence memory ability (Khalida, 2015).

Breakfast consumption can also affect several aspects of cognitive function; differences in the composition of the intake of foods consumed at breakfast can also affect a series of cognitive functions that include short-term memory, auditory attention, spatial memory, and visual perception so that the composition of each child's breakfast intake can affect their short-term memory (Mahoney et al., 2005).

The results of the analysis of Table 2 on the relationship between breakfast habits and nutritional status showed that one student (0.9%) had more nutrition but never had breakfast. Then there was one student (0.9%) who had less nutrition with breakfast habits in the frequent category or breakfast > 4 times a week and concluded in this study that there was no relationship between breakfast habits and nutritional status.Children who do not have breakfast in the morning can consume snacks that are less balanced in terms of nutritional content, so children who do not have breakfast will experience a lack of food intake, which causes the child's nutritional status to be less. While there is a chance that children who do not have breakfast will experience an increase in body weight because during the day and night, they will feel hungrier and eat more and because at night, they do

little physical activity causing energy in and energy out is not balanced (Hartini Mardi Asih et al., 2017). On the other hand, research by Hanim et al. (2022) shows that there is no relationship between breakfast habits and children's nutritional status (p=0.670). Research by Miko & Dina (2016) also showed no relationship between morning eating patterns and nutritional status (p=0.769). This study also showed similar results; as many as 38 students who often do breakfast have good nutritional status, and 25 students rarely do breakfast in a week who have good nutritional status as well. Other factors can affect the nutritional status of respondents besides breakfast habits, such as their daily intake during the day and in the afternoon. Food intake is assessed by the quality and quantity of the food; if the food meets the daily energy needs, then good nutrition will be achieved. One respondent often has breakfast but has a nutritional status of less; this can occur if the quality and quantity of food intake do not meet their daily energy needs (Miko & Dina, 2016).

3.3 Thematic Analysis

Table 3: Thematic Analysis.

	Encouraging	Inhibiting
Parents	- Teaching breakfast from an early age. - Requiring breakfast before going to school.	- Child abandonment.
School	- Provide information on the importance of breakfast. - Breakfast program once a week.	- Get to school at half past 7.
Menu	- A varied and interesting menu.	- Not provided.
Child	- Told by mom. - To be energetic at school.	- Wake up late in the morning. - Being lazy to eat in the morning. - Getting an upset stomach if eating breakfast.

Based on the results of Table 3 thematic analysis of the factors encouraging and inhibiting student habits at SDN Pekayon 05 and SDN Kalisari 05, 4 factors were obtained, namely from parents, schools, menus, and children. There are 7 causes of all factors that encourage students to have breakfast and 6 causes of factors that inhibit students from having breakfast before going to school.

4 CONCLUSIONS

In quantitative research, there is a relationship between breakfast habits and cognitive abilities in short-term memory, and there is no relationship between breakfast habits and cognitive abilities in learning achievement and nutritional status. In qualitative research, students' breakfast habits are factors from parents, schools, and menus provided. The motivating factor for breakfast is the menu provided, and the inhibiting factor for breakfast is waking up late before school. Factors of students' breakfast habits are factors from parents, schools, and menus provided.

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UTILIZATION OF CATFISH BONE FLOUR (CLARIAS BATRACHUS) IN MAKING BOMBOLONI DONUTS AS A SOURCE OF CALCIUM WITH CHOCOLATE JAM FILLING

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Keywords: Catfish bone flour, calcium, bomboloni donuts, adult.

Abstract: Calcium is one of the micronutrients that has an important role in human health, because calcium deficiency can cause gowth disorders in the body. The strategy to increase calcium intake is by adding catfish bone flour in making bomboloni donuts with chocolate jam filling. The purpose of this research is to utilize local food ingredients that can be developed into alternative products. Methods: The study used a completely randomized design (CRD) with two factors and two replications. The factor in the study was the addition of catfish bone flour to substitute wheat flour which consisted of 4 levels, namely F0 (100% : 0%), F1 (97% : 3%), F2 (95% : 5%), and F3 (93% : 7%). The analysis carried out in this study included yield, proximate content (water, ash, protein, fat, carbohydrates) and calcium content in catfish bone flour for the bomboloni donut product. Organoleptic analysis was carried out using the hedonic test method and hedonic quality to determine the formula that selected based on sensory characteristics and then proximate analysis (water, ash, protein, fat, carbohydrates) and calcium levels. Organoleptic test results data were analyzed statistically with the Kruskal Wallis test and followed by the Mann Whitney test with a significance level of 95%. Results: The addition of catfish bone flour in the manufacture of bomboloni donuts with chocolate jam filling resulted in the highest-rated formulation, whicg was F3 (93% : 7%). Conclusion: In 100 g catfish bone flour bomboloni donuts filled with chocolate jam 16.03% water, 4.06% ash, 8.58% protein, 15.06% total fat, 56.26% carbohydrates, 394,9 kcal total energy, 135.67 kcal energy from fat, and 1051.72 mg calcium. One can consume as much as 1 piece or the equivalent of 40 g a day based on the analysis of the serving size of bomboloni donuts.

1. INTRODUCTION

A lack of calcium intake can be characterized by disruption of the growth process which often occurs in people in developing countries. This is due to a lack of calcium intake than the recommended calcium requirement for adolescents per day is 1200 mg. and a lack of milk intake which is not a major part of daily consumption in developing countries. So it is necessary to seek other sources of calcium intake to meet these needs (Shita & Sulistiyani, 2015). Based on research results (Sudiarmanto & Sumarni, 2020) it is reported that 92.6% of junior high school students in Surabaya suffered calcium deficiency.

Catfish bones are fisheries waste that can be used in the food sector through the process of making catfish bone flour. According to Tanuwidjaya (2002) calcium in fish is not only found in the flesh but also in the fish bones. The nutritional content of fish bone flour in 100 grams is 735 mg calcium, 9.2 grams of protein, 44 mg of fat, 345 mg of phosphorus, 78 mg of iron, 24.5 grams of ash, 0.1 mg of carbohydrates (Permitasari, 2013). The high calcium content in catfish bones can be used to make catfish bone flour which has the potential to be a food source of calcium that is easily accessible to the public and can be used as an alternative diet to prevent diseases caused by calcium deficiency (Permitasari, 2013).

Bomboloni donuts are a type of donut from Italy that are in great demand by Indonesian people, from children to adults. Bomboloni donuts are round and contain jam inside (Prabowo, 2018). Therefore, this research aims to develop bomboloni donuts with the substitution of catfish bone flour that have added value on the nutrient content, particularly calcium, while considering consumer preferences.

2. METHODOLOGY

2.1 Materials

This research used the following ingredients to make bomboloni donuts: “Cakra” wheat flour, catfish bone flour, yeast, bread improver, vanili, sugar, butter, water, and filling chocolate. The chemical ingredients for proximate and calcium analysis are also used.

2.2 Equipment

This research used the following tools to make bomboloni donuts: basin, mixer, scale, rolling pin, brush, oven, plastic, and baking sheet. The instruments used for product chemical analysis are the analytical service laboratory method (Saraswanti Indo Genetech, Bogor).

2.3 Research Design

This research is an experimental research using a Completely Randomized Design with two replications. The treatment parameter in this study was the substitution level of wheat flour with catfish bone flour.
The consecutive research stages are as follows.
- Stage 1 = F0: (flour : catfish bone flour = 100% : 0%)
- Stage 2 = F1: (flour : catfish bone flour = 97% : 3%)
- Stage 3 = F2: (flour : catfish bone flour = 95% : 5%)
- Stage 4 = F4 : (flour : catfish bone flour = 93% : 7%)

The results of both organoleptic tests and chemical analyses were subjected analyzed statistically with the non-parametric Kruskal Wallis test, followed by a non-parametric Mann Whitney test with a significance level of 95%. The selected formulation is determined using the Exponential Comparison Method (MPE), which involves weighting based on the results of hedonic test analysis and hedonic quality.

2.4 Research Stage

This research was conducted through two stages. In the raw material preparation process (Stage 1), the catfish bone is made into flour to substitute in the making bomboloni donuts and formulation. In stage 2, the organoleptic test was performed by 5 hedonic scales line to observe panelists' preference in terms of color, aroma, texture, and flavor using not-trained panels. This research also involved 70 adults as panelists. The chemical analysis was carried out to know the effect of the catfish bone flour substitution level on the nutritional content (proximate, calcium,) of the bomboloni donuts produced.

2.5 Methods

The catfish bone flour making used a roasting method before the flouring process. The catfish bone flour making adopted the Syah et al,(2018) method with a few modifications. The making bomboloni donuts was carried out trough several stages: the ingredients maxing, which follows formula provided in Tabel 1.

Table 1: Bomboloni Donuts Ingredients for The Formulas

Material Type (g)	F0	F1	F2	F3
	0%	3%	5%	7%
Flour	100	97	95	93
Catfish bone flour	0	3	5	7
Yeast	2	2	2	2
Bread Improver	2	2	2	2
Vanili	1	1	1	1
Sugar	15	15	15	15
Butter	20	20	20	20
Water	50	50	50	50
Bomboloni donut filling				
Chocolate Jam	20	20	20	20
Total	210	210	210	210

2.6 Analitycal Procedures

The analysis performed was in the form of an organoleptic test consisting of a preference test (hedonic) and a hedonic quality test involving 70 not-trained panelists. The preference test (hedonic) assessed several aspects, i.e. color, aroma, texture, and flavor, and were measured by 5 hedonic scales line, namely 1: very dislike; 2: dislike; 3: rather like; 4: like; 5: very like.

The hedonic quality test assessed aroma, texture, and flavor level. In terms of aroma, it involved 5 scales line; they are 1: very unreal yeast aroma; 2: unreal yeast aroma; 3: rather real yeast aroma; 4: real yeast aroma, and 5: very real yeast aroma. The color's hedonic quality test also involved 5 scales line, namely 1: very not golden brown; 2: not golden brown; 3: rather; 4: golden brown; 5: very golden brown. The flavor's hedonic quality test consisted of 5 scales line, i.e., 1: very fishy taste; 2: fishy taste; 3: rather, 4: litte fishy taste; 5: not detected. The texture's hedonic quality test also involved 5 scales line, i.e., 1: very soft; 2: soft; 3: rather; 4: not soft; 5: very not soft.

3. RESULT AND DISCUSSION

3.1 Comparison of The Result of Proximate Analysis, Calcium Catfish Bone Flour.

The analysis result in question are provided in Table 2 below.

Tabel 2: Comparison of The Results of Analysis Catfish Bone Flour per 100 grams

Nutrient Content	Catfish Bone Flour*	Catfish Bone Flour
Water (%)	-	7,35
Ash (%)	24,5	69,57
Fat (%)	0,044	2,06
Protein (%)	9,2	14,32
Carbohydrate (%)	0,0001	6,68
Calcium (mg)	735	21505,54
Energy (kkal)	37,1	102,62

Source: * Permitasari (2013)

The results of proximate and calcium analysis in catfish bone flour showed significant differences compared catfish bone flour in permitasari (2013). The advantage of catfish bone flour in this study is its calcium and protein content. According to the result, it was then carried out a substituted with wheat flour, it was expected that there would be a significant increase in the calcium levels in processed products.

According to table 2, the calcium content of catfish bone flour is far above catfish bone flour in previous research. Calcium analysis result, which is 21,5%. This result has a significant difference with the calcium content of catfish bone flour, that is 17,47% (Permitasari, 2013) and base on Regulation No. 1 of 2022 from the Head of the Food and Drug Supervisory Agency of the Republic of Indonesia concerning the Supervision of Claims on Processed Food Labels and Advertisements, a food product can be deemed a source of calcium if it fulfills 15% ALG per 100 g of ingredients or the equivalent of 165 g per 100 g of ingredients (BPOM, 2022).

3.2 Hedonic Test Result (Preference) of Bomboloni Donuts of The Four Formulas (F0, F1, F2 and F3)

The hedonic test result and the significant differences analysis between treatment levels by Kruskal Wallis test and a further testing by Mann-Whitney test are presented in Table 3 as follows.

Table 3. The Catfish Bone Flour Effect on The Color, Aroma, Flavor, and Texture Hedonic Score.

Treatment	Sample Hedonic Test Mean Value			
	Color	Aroma	Flavor	Texture
F0	4.2±0.79	4.00±1.07	4.21±0.92	3.08±1.04
F1	3.83±1.09$^{a.b}$	3.76±1.10	4.04±1.10	3.69±1.24
F2	4.29±0.77$^{a.c}$	3.77±1.01	4.09±1.05	3.97±1.07
F3	4.24±10448$^{a.c.d}$	3.81±1.27	4.14±-972	3.85±1.09

a, b, c, d The difference in letter denotes a significant different between treatment levels ($p<0.05$) in the non-parametric tests, Kriskal Wallis, followed by Mann-Whitney test

The highest panelists average score on the bomboloni donuts color preference was in the F2. The panelist preferered F2 for the bomboloni donuts has a brigher color then the substituted bomboloni donuts. It is because the catfish bone flour's color is bright than the wheat flour. The color of the product produced affects the color of the fish bone meal used (Bunta et al., 2013). The difference test result showed that catfish bone flour substitution level significantly affected panelists' preference regarding color parameters. Based on the further testing results, the panelists' preference on the color was varied.

The highest panelists average score on the bombolni donuts aroma was in the F0 formula (control). The panelits preferred F0 because its smells more vanilli than those other substituted formulas that tend to have a fish aroma. The catfish bone flour not-significantly affected panelists' preference in terms of aroma parameters. Furthermore, the Kruskal-Wallis test showed that catfish bone flour substitution level not-significantly affected panelists' preference in terms of aroma parameters.

The highest panelists' average score on the bomboloni donuts texture preference was also in the F2 The panelists preferred F2 because the bomboloni texture was more soft. The Kruskal-Wallis test result showed that catfish bone flour substitution level not-significantly affected panelists' preference in terms of texture.

The highest panelists' average score on the bomboloni donuts flavor preference was also in the F0 formula (control) and F3 formula. It also indicated that the panelists preferred the products without substitution for their vanilli flavor as the product's characteristics were still dominant. The vanilli taste of the substituted products was reduced due to the catfish bone flour not fish taste. Such hedonic test results are expected because statistically, the flavor is similar to the F0 formula, meaning that up to 10% of substitution rate is still acceptable. The flavor parameters come into a major consideration in which product customers make their choice. According to the tabel 3, it is clearly showed that F3 bomboloni donuts is closer to control products in terms of the flavor (Table 3). It means that a substitution rate of up to 10% is still acceptable.

3.3 The Hedonic Quality Test Result of Bomboloni Donuts of The Four Formulas (F0, F1, F2 and F3).

The hedonic quality test result and the significant differences analysis between the treatment levels by Kruskal-Wallis and the Mann-Whitney test further testing are described in the following table.

Table 4. The Catfish Bone Flour Effect Substitution Effect on The Hedonic Quality Score on The Aroma, Flavor and Texture.

Treatment	Sample Hedonic Quality Test Mean Value			
	Color	Aroma	Flavor	Texture
F0	4.10±0.79	3.36±1.29	4.24±1.10	3.62±1.17
F1	3.75±1.11	3.39±1.28	4.27±0.91	3.72±1.16
F2	4.09±0.91	3.15±1.28	4.02±1.21	3.69±1.13
F3	4.21±0.95	3.17±1.28	4.38±0.83	3.68±0.99

a, b, c and d The difference in letter denotes a significant different between treatment levels ($p<0.5$) in the non-parametric tests, Kruskal Wallis, followed by Mann-Whitney test

The panelists' assessment of the aroma quality hedonic showed that F1 has the highest score, followed by F0, F3 and F2. However, if it is analyzed statistically by Kruskal Wallis, the substitution level had no significant effect.

The highest panelists' assessment score in terms of texture quality was F1, followed by F2, F3 and F0. The substitution no-significantly affected panelists' assessment of the hedonic quality of the texture.

The catfish bone flour substitution level also no-significantly affected flavor hedonic quality. The F3 formula obtained the highest score, followed by F1, F0 and F2.

The panelists' assessment of the color quality hedonic showed that F0 has the highest score, followed by F3, F2 and F1. However, if it is analyzed statistically by Kruskal Wallis, the substitution level had no significant effect.

According to the hedonic quality table 4, the highest average score is the hedonic quality of the flavour, followed by the color hedonic quality, texture hedonic quality and the aroma hedonic quality. Thus, the more acceptable substitution level of catfish bone flour is 10%.

3.4 The Bomboloni Donuts with Selected Formula.

Table 5. Results of Analysis of the Contents of Bomboloni Donuts with Selected Chocolate Jam Filling.

Nutrient Content	Unit	Result	SNI
Water (%)	**%**	16,03	Max 40
Ash (%)	**%**	4,06	Max 0,1
Fat (%)	**%**	8,58	-
Proltelin (%)	**%**	15,06	-
Carbohydrate (%)	%	56,26	-
Elnelrgy (kkal)	Kcal/100 g	394,9	-
Energy from fat (kkal)	Kcal/100 g	135,67	-
Calcium	%	1051,72	-

Source: Standar Mutu Dolnat (SNI 8372:2018)

The water content of bomboloni donuts tends to be

low with the substitution treatment. The low water content in dolnat bomboloni products can meet the maximum quality requirements for sweet bread, namely 40% (SNI, 2018). So it can be concluded that the water content in the bomboloni dolnat filled with selected chocolate jam has a long shelf life.

The ash content increases as the level of substitution increases. The high level of minerals in fish bone meal will influence the increase in the mineral content of the donuts produced (Deswita & Fitriyani, 2019). The ash content in catfish bone meal is 59.49%, which causes donut products that add catfish bone meal to have a higher ash content value (Mahmuda, 2013). In line with Wiryadi's (2007) statement in Subandoro et al. (2013) if the ash content is too high, it can result in poor color and texture.

3.5 Serving Suggestions

Serving size is the amount of food product usually consumed in one meal. Serving suggestions are needed so that consumers can consume each food product according to their needs based on the Nutrition Label Reference (BPOM RI, 2016). The determination of serving size is stated in BPOM Number 26 of 2021 which states that food is categorized as bacterial product with a serving size ranging from 40-100 g (BPOM, 2019).

The nutritional facts for bomboloni donuts can be reviewed based on Table 6.

Table 6. Nutrition Fact of Bomboloni Donuts.

Nutrition Facts		
Serving size:	40 g (1 pcs)	
Serving oer Container	5	
Amount Per Serving		
Total Energy	158 kcal	
Energy from Fat	54 kcal	
		% AKG*
Total Fat	6 g	8%
Protein	3 g	5%
Carbohydrate	22 g	6%
Calcium	420 g	38%
**Percent Daily values are based on a 2150 calories diet. Ypur daily values may be higher or lower depending on you calories needs.*		

The nutritional fact of Bomboloni donuts filled with chocolate jam for 1 serving is 40 g with a total energy content of 158 kcal, energy from fat 54 kcal, total fat 6 g, protein 3 g, carbohydrates 22 g, and calcium. 420mg. The catfish bone flour bomboloni donut product with chocolate jam filling can be said to be a source of calcium because it has a calcium content of 1051.72 mg per 100 g.

In one package of bomboloni donuts, 5 servings, for this reason consumers are able to consume bomboloni donuts with the claim of being a source of calcium that can meet daily calcium intake. Therefore, adequate calcium intake for Indonesian people can be increased by consuming food sources of calcium, one of which is bomboloni donuts made from catfish bone flour.

4 CONCLUSIONS

Substitution of catfish bone meal did not-significant effect on the level of hedonic and the hedonic quality of bomboloni donuts, except the hedonic quality of color. Bomboloni donuts with a 10% substitution rate is acceptable to society.

Additionally, the catfish bone flour substitution significantly increased the bomboloni donuts calcium content . Moreover, the catfish bone flour substitution significantly affected the bomboloni donuts. The higher the substitution level, the bomboloni donuts nutritional calcium value will also increase because the catfish bone flour are superior in nutritional value compared to wheat flour.

Thus, one can consume as much as 1 piece or the equivalent of 40 grams a day based on an analysis of the serving size of Bomboloni donuts to meet daily calcium needs.

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Analysis of Flavonoid and Beta-carotene Content in Red Spinach Extract (Amaranthus tricolor L) Mira Variety

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Keywords: Red Spinach, Flavonoids, Beta-carotene

Abstract: Red spinach is a vegetable that is often consumed and used in traditional medicine in Indonesia. The red spinach of the Mira variety is a spinach that is cultivated by the people of Bantul Regency. In addition, it has the potential to contain phytochemicals (flavonoids and beta-carotene) which can be used for health. However, studies on the analysis of flavonoids and beta-carotene in spinach extracts of the Mira variety have never been carried out. This study aims to analyze the content of flavonoids and beta-carotene in the red spinach Mira variety. Red spinach simplicity was added with 80% ethanol and 3% citric acid extracted using the maceration method. Analysis of flavonoids using the Spectrophotometer method. Analysis of beta-carotene using the Carr Price method. The red spinach extract of the mira variety had a flavonoid content of 2.48 mg/g, which was higher than celery leaves 0.50 mg/g and hibiscus leaves 1.42 mg/g. Beta-carotene extract of red spinach varieties mira 3.47 mg/g higher than melon 0.05 mg/g and basil leaves 0.07 mg/g. In conclusion, the red spinach extract of the Mira variety contains flavonoids and beta-carotene. Further research is needed to see antioxidant activity and pre-clinical research on the disease.

1 INTRODUCTION

Indonesia is a country rich in natural resources. Various types of plants exist in Indonesia and are used as traditional medicines. The utilization of plants as medicinal materials has long been done by the community to treat various diseases. Vegetables are one of the plant products rich in vitamins and minerals needed by humans. The nutritional content of vegetables is also known to have potential for human health such as prevention and therapy for several diseases (Saparinto *et al.*, 2013; Lahamado *et al.*, 2017).

One type of vegetable that is often utilized is red spinach (Amaranthus tricolor L). Red spinach belongs to the Amaranthaceae family with the genus Amaranthus. Spinach is also divided into two types, green spinach, and red spinach. In addition, there are also several varieties of spinach, including the Mira variety, carla variety, Asian star variety, and red beret variety. The Mira variety of red spinach is one of the spinach varieties cultivated in Yogyakarta. This red spinach variety is a red spinach that has a soft stem and is reddish-white, the leaves have a round shape with slightly tapered ends and there are clear veins, the color of the leaves is purplish red and the height of this red spinach can reach ± 1½ meters (Sunarjono *et al.*, 2017). Red spinach contains phytochemical components that are high in antioxidants and polyphenols so that it can be used for health such as prevention and therapy of several diseases and maintaining health. (Clemente *et al.*, 2017; Wiyasihati and Wigati *et al.*, 2016).

Flavonoid compounds usually have red, blue, and purple colors. The Mira red spinach variety physically has a dark red color. So, it is possible to have a high flavonoid content. Flavonoids are found in all parts of vegetables including leaves and stems. Flavonoids have many benefits, one of which is their antioxidant properties (Kumar and Pandey, 2013; Faizal *et al*., 2018).

Several studies have shown that flavonoids not only function as antioxidants but can also function as anti-inflammatory, antidiabetic, antidiarrheal, and antihyperlipidemic (Zou *et al.*, 2015; Kurniawati *et al.*, 2016; Bandy *et al.*, 2021). Previous research shows that red spinach has a flavonoid content of 0.66 mg/g, but the variety is not yet known (Ghasemzadeh *et al*., 2012; Putra *et al*., 2015; Gustia *et al.*, 2017). The red spinach variety Mira has the potential to have

a high flavonoid content seen from its color, but the examination of flavonoids in red spinach variety Mira has never been done.

Beta carotene is a group of carotenes found in red, purple, and green vegetables such as spinach (Rahmah *et al.,* 2017). Previous research shows that red spinach has a high beta-carotene content (Chandra *et al*., 2017; Sari *et al*., 2018). However, the examination of beta carotene in red spinach varieties of Mira has never been done. Beta carotene has a very important role in the formation of vitamin a as provitamin a and functions as an antioxidant. Antioxidants are needed by the body to slow down the speed of initiation reactions in the process of free radical formation in a chain, and this is beneficial in preventing non-communicable diseases such as diabetes mellitus (Syaiffudi *et al*., 2015; Sabuluntika *et al*., 2017).

This Mira variety of red spinach can be consumed directly as a vegetable, but when made in extract form, it will make the shelf life longer, have higher nutrients, and be practical for consumption. In addition, it can facilitate flavonoid and beta-carotene compounds in the red spinach variety Mira by extraction (Taroreh *et al*., 2015).

Red spinach in this study used the Mira variety of red spinach which is cultivated by the people of Bantul Regency, Yogyakarta. So far no research has been conducted related to the analysis of the content of flavonoids and beta-carotene in red spinach extract of the Mira variety. Red spinach variety Mira has the potential to contain flavonoids and beta-carotene. Therefore, to provide empirical evidence, it is necessary to analyze the extract of red spinach of the mira variety. Based on this background, the researcher aims to analyze the flavonoid and beta carotene content of red spinach extract of mira variety.

2 METHODS

The red spinach used was the 29-day-old Mira variety obtained from Bantul Regency (Yogyakarta). Extraction of red spinach and beta carotene analysis test was conducted at the Food and Nutrition Laboratory of Sebelas Maret University. Flavonoid analysis at Chem-Mix Pratama Laboratory Yogyakarta in May 2023.

2.1 Tools and Materials for Making Simplicity

Basin, clean water, scales, spinach leaves, oven, flouring machine, 60 mesh sieve.

2.2 Tools and Materials for Extract Preparation

Rotary evaporator, filter paper, measuring cup, digital scales, erlenmeyer, orbital shaker, centrifuge, equates, mira variety red spinach flour, ethanol 80%.

2.3 Procedure for Making Simplicity

800g of fresh Mira variety red spinach leaves were washed under running water. Wet sorting was carried out to remove damaged leaves. The leaves were drained on a draining rack and dried at room temperature (±25 ^{o}C) for 24 hours to remove the attached water. Then, drying is done using an oven at 40^{o}C for (24 hours). After drying, it is then mashed using a flouring machine and sieved using an 80-mesh sieve to obtain 150g of spinach flour (Widarta *et al*., 2019; Septyaningrum *et al.,* 2021).

2.4 The Extraction Procedure

Red spinach flour of mira variety was weighed 150 g and added 80% ethanol in a ratio (1:5) which was acidified with 3% citric acid (the ratio of ethanol and acid was 85:15 (v/v) and then allowed to stand for 24 hours. Stirred for 4 hours at 150 rpm using an Orbital Shaker. The solution was centrifuged for 30 minutes at 4000 rpm. The supernatant was filtered using filter paper and thickened with a rotary evaporator at 50^{o}C to obtain a thick extract of red spinach variety mira as much as 20.6g (Putri *et al*., 2015; Chaiyasut *et al.,* 2017).

2.5 Flavonoid Content Determination

Determination of flavonoid content using the Spectrophotometry method. Weigh 5 g of red spinach extract sample, and dissolve it in 100 ml of ethanol. After filtering, take 1 ml of clear solution and add 3 ml of 5% $AlCl_3$ solution. Then add ethanol to a volume of 10 ml. Next, the absorbance was read using a Spectrophotometer with a wavelength of 420 nm. The data obtained was calculated using the Quercetein standard curve (Yulianingtyas *et al.,* 2016). The calculation of flavonoid content can be done with the following equation:

$$\% \text{ flavonoid levels} = \frac{x.dilution\ factor}{sample\ weight\ mg} x\ 100\% \quad x = \frac{y-a}{b}$$

2.6 Determination of Beta Carotene Level

Determination of beta carotene levels using the Carr Price method. The sample of red spinach extract was weighed 2 g and put into a test tube. The red spinach extract sample was added 2.5 ml of ethanol and vortexed for 1 minute. Next, 10 ml petroleum ether was added and vortexed for 10 minutes. After that, the sample of the mixed solution was put in a separating funnel for separation by adding distilled water, so that two layers were formed in the separating funnel. The clear white colored solution was discarded while the yellow-colored one which is beta carotene was collected. Then the sample of red spinach extract was added to petroleum ether up to 3 ml. The sample was assayed at 450 nm wavelength with petroleum ether blank. The absorbance of the artificial standard was measured. The standard is 20 mg $K_2Cr_2O_7$ dissolved in 100 ml of distilled water, taken 1 ml, and then diluted to 10 ml with distilled water. Dilution of absorption at a wavelength of 450 nm was carried out with a blank of distilled water (Chandra *et al*., 2017).
Artificial carotene standards: 20mg $K_2Cr_2O_7$ = 5,6 µg karoten /5ml

$$\text{Total carotene } \left(\frac{\mu g}{g}\right) = \frac{abs\ sample\ /\ abs\ standard\ X fp\ X\ 5{,}6}{sample\ weight}$$

3 RESULTS

The yield of red spinach extract of mira variety in Table 1 was 13.73 % from the initial weight of red spinach flour of 150 g and became a red spinach extract of 20.6 g.

Table 1: Yield of Red Spinach Extract of Mira Variety.

Sample	Initial Weight	Condensed Extract	Yield
Mira variety red spinach extract	150 g	20,6 g	13,73 %

The results of flavonoid analysis and total beta carotene in Table 2 show that the red spinach extract of the mira variety has an average content of total flavonoid compounds of 2.48 mg/g ± 0.01 and the average content of beta carotene compounds of 3.47 mg/g ± 0.33 with repetition 2 times.

Table 2: Phytochemical Compound Analysis of Red Spinach Extract Mira Variety.

Phytochemical Compound	Analysis I	Analysis II	Average	SD
Flavonoid	2,49 mg/g	2,48 mg/g	2,48 mg/g	±0,01
Beta-carotene	3,64 mg/g	3,31 mg/g	3,47 mg/g	±0,33

4 DISCUSSION

Based on Table 1, the thick red Mira spinach extract obtained by maceration method with 80% ethanol solvent and 3% acid obtained a yield of 13.73%. The yield is the ratio between the extract obtained and the initial simplicity. The higher the yield value produced, the more extract value produced (Budiyanto *et al*., 2015; Purnamasari *et al*., 2019). The high yield may be due to the extraction method used, maceration. Maceration is a method that is more widely used to extract natural materials. The maceration method is extraction with cold solvents that do not require a heating process so as not to damage the active substances in the sample (Badaring *et al*., 2020). In addition, the maceration method can produce higher yields (Hasnaeni *et al.,* 2019). In addition, when compared to research by Guntari *et al*. (2020) yield value of 9.9% was found. This difference is thought to be due to the different varieties used, solvents, and maceration stirring processes so the results obtained will also be different. This is in line with the research of Kawiji *et al.* (2015) which also states that the variety, stirring process during maceration, type of solvent, time and temperature used during the extraction process can affect the amount of yield.

Based on Table 2, it is found that the red spinach extract of the mira variety has flavonoids (2.48 mg/g ± 0.01) and beta-carotene (3.47 mg/g ± 0.33). The results of flavonoids and beta-carotene content in red spinach varieties of Mira are higher than several other plant species such as green spinach 0.44 mg/g, celery leaves 0.50 mg/g and waru leaves 1.42 mg/g (Lumbessy *et al*., 2013; Ghasemzadeh *et al*., 2014; Rizqianingrum *et al.,* 2022). Beta-carotene of red spinach extract of mira variety (3.64 mg/g; 3.31 mg/g) was higher than that of melon 0.05 mg/g, basil leaves 0.07 mg/g and cantaloupe 2.15 mg/g (Idris *et al*., 2011; Kusbandari *et al*., 2017; Wahyuni *et al*., 2019). In addition, the results of this study have differences in flavonoid content in Guntari *et al*. (2020) which obtained flavonoids in red spinach

extract in the amount of 0.56 mg/g. The flavonoids and beta carotene content was lower than the extract of red spinach variety Mira. The difference in flavonoids and beta carotene content in green and red spinach extracts compared to red spinach mira varieties is due to the different types of varieties used. In line with Cempaka *et al.,* (2014) proved that differences in the phytochemical content of foodstuffs are due to varietal differences. In addition, the difference in pigments between the red spinach variety mira and green spinach can affect the difference in flavonoids and beta-carotene levels. In general, flavonoid levels in food ingredients will be higher if the color of the food ingredients is brighter. This is in line with several studies that state there are several factors that affect the differences in compound components in plants such as variety, plant age, growing time, air temperature, and environment (Asturi *et al*., 2014; Kilkoda *et al*., 2015; Sari *et al*., 2022).

The high content of flavonoids and beta carotene in Mira spinach compared to other spinach varieties allows Mira spinach to be used for the prevention and treatment of degenerative diseases. Several studies have proven that flavonoids and beta carotene have anti-diabetic, anti-inflammatory, anti-aging, antidiarrheal, antihyperlipidemic, anti-bacterial, and other diseases caused by oxidative stress (Panche *et al*., 2016; Suksanga *et al.* 2022; Ahmed *et al*., 2022; Zhang *et al.,* 2022; Shamsudin *et al.,* 2022). It is necessary to conduct further pre-clinical research to see the effect and determine the appropriate dose of red spinach extract of mira variety as an herbal treatment therapy for a disease.

5 CONCLUSION

Red spinach extract of mira variety from Bantul Regency, Yogyakarta has a total flavonoid phytochemical content of 2.48 mg/g and beta carotene beta carotene of 3.47 mg/g. Further research needs to be done related to the antioxidant activity of red spinach extract and pre-clinical on experimental animals to see the effect of red spinach extract of mira variety on a disease.

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THE RELATIONSHIP BETWEEN SLEEP DURATION AND EMOTIONAL EATING WITH OVER NUTRITION IN ADOLESCENTS AT SMPN 3 BEKASI

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Keywords: Adolescents, Emotional Eating, Over Nutrition, Sleep Duration.

Abstract: Over nutrition in adolescents can worsen the quality of human resources and in adulthood can be at greater risk of degenerative diseases, such as diabetes mellitus, coronary heart disease, cancer, hypertension, stroke, and increasing obesity. This research is a quantitative study with a cross sectional design. The sample for this research was all students of class VII – IX at SMPN 3 Kota Bekasi, consisting of 100 respondents. The sampling technique uses Consecutive Sampling. Data collection used Sleep Timing Questionnaire (STQ), Dutch Eating Behavior Questionnaire (DEBQ), and was analyzed using Chi Square and Fisher's Exact tests. The results of the analysis showed that the p-value of the relationship between sleep duration and over nutrition was p-value = 0.683 (p>0.05) and the relationship between emotional eating and over nutrition was p-value = 0.807 (p>0.05). The conclusion of this study is there is no relationship between sleep duration and emotional eating with over nutrition in adolescents at SMPN 3 Kota Bekasi.

1 INTRODUCTION

Adolescence is a period of rapid mental, physical and intellectual growth and development. Adolescents are between 10 and 19 years old (WHO, 2017). Based on the Regulation of the Minister of Health of the Republic of Indonesia No. 25 of 2014, youth aged 10 to 18 years. Based on World Population Datasheet in 2021 the total world population is 7.8 billion people. There are 46 million teenagers (UNICEF, 2021). The total population of Indonesia is 275.77 million people (BPS, 2022).

In Indonesia, adolescents are faced with three nutritional problems, namely wasted, overweight, and micronutrient deficiencies (UNICEF, 2021). Based on Riskesdas (2018) the prevalence of undernourished adolescents aged 13 to 15 years was 8.7% (severly thinness and thinness) and 16% over nutrition (overweight and obese), so the percentage of adolescents who have overweight is higher than adolescents with less nutrition. The prevalence of overnutrition in West Java Province in adolescents aged 16 to 18 years is 10.9%, adolescents in urban areas have a higher prevalence of 10.7% compared to rural areas, namely 8.1% (Kemenkes RI, 2018). In addition, the prevalence of over nutrition in Bekasi aged 16 to 18 years has increased in percentage from nutritional status can be caused by many reasons, including diet, physical activity, besides that, sleep duration (Hadi, 2019).

Short sleep duration contributes to the occurrence of obesity through the behavior of little physical activity and increased consumption of food (Hayes et al., 2018). Someone who is sleep deprived will increase the Ghrelin hormone and decrease the leptin hormone, there by affecting energy intake and Body Mass Index (Kurniawati et al., 2016). Based on Badi'ah's research (2019) states that sleep duration

and obesity at Al-Azhar Middle School located in Semarang have a relationship (positive relationship), sleep duration variable is a protective factor, so good sleep duration has a risk of 0.158 times for obesity. Based on the results of Amrynia and Prameswari's research (2022) stated that there is a positive relationship between sleep duration and over nutrition in adolescents.

According to Meidiana et al. (2018), adolescents with over nutrition have an 80% risk of becoming obese as adults. The negative effects caused by overweight make adolescents with more nutrition into the at-risk population (Widianto et al., 2017). Over nutrition at a young age creates the possibility of a risk of degenerative diseases, including diabetes mellitus, cancer, coronary heart disease, hypertension, stroke, and others (Kemenkes RI, 2020).

The researcher chose the location of SMPN 3 Bekasi in East Bekasi District because it is one of the leading schools and is located in the center of Bekasi cwhich is strategically expected to represent a sample of young people in Bekasi. So researchers are interested in conducting research with the title "The Relationship between Sleep Duration and Emotional Eating with Over Nutrition in Adolescents at SMPN 3 Bekasi".

2 SUBJECTS AND METHODS

This research is a quantitative study using a study design cross sectional. This research was conducted at SMPN 3 Bekasi which is located at Jalan KH Agus Salim Number 75, Bekasi Jaya, East Bekasi District, Bekasi, West Java Province. This research was conducted on class VII-IX students who were carried out directly. This research was conducted from March to June 2023. The sampling technique used is non-probability sampling namely method consecutive sampling. According to Nursalam (2017) consecutive sampling is a research sample that is selected if it meets the research criteria and is included in the study for a certain period until the number of samples is fulfilled. Sample in this study amounted to 100 respondents.

The characteristics of the independent and dependent variables can be explained using univariate analysis. The frequency and percentage distribution of each variable is the result of univariate analysis (Pannu et al., 2016). In this study, univariate analysis included general data such as age and gender, followed by specific data such as sleep duration, emotional eating, and over nutrition. This study used bivariate analysis to determine the relationship between sleep duration and emotional eating with over nutrition in adolescents at SMPN 3 Bekasi. This study used is Chi Square test and Fisher's Exact test. This research has received approval from Komisi Etik Penelitian Kesehatan (KEPK) Universitas Muhammadiyah Prof. Dr. Hamka with number 03/23.03/02346.

Measures

Research instruments consists of Self identity form and respondent measurement results, digital scales calibrated by Unit Legal Metrologi Bekasi on March 2023, microtoise, Sleep Timing Questionnaire (STQ), Dutch Eating Behavior Questionnaire (DEBQ). The Sleep Timing Questionnaire (STQ) has been tested for validity and reliability, the values Cronbach's Alpha (0.83) (Damayanti et al., 2022). The Dutch Eating Behavior Questionnaire (DEBQ) has been tested for validity and reliability, the Cronbach's Alpha (0.846) (Rahmadhani and Mahmudiono, 2021).

Respondent sleep duration in this study was grouped into two categories. The good category is ≥ 8.5 hours and the bad category is < 8.5 hours. Sleep duration in this study was determined by calculating the average sleep duration on school days and weekends minus the average time lost due to unwanted awakenings. Respondent emotional eating was categorized into two categories. The low category is the average score ≤ 2.35 and the high category is the average score > 2.35 (Sukianto et al., 2020). Average score (mean) emotional eating in this study obtained from the total score based on the Likert scale interval 1 - 4 where the weight of four indicates strongly agree (SS), three to agree (S), two to disagree (TS), and one to strongly disagree (STS), then divided by the number of questions (13 questions).

3 RESULT

3.1 Univariate Analysis

Table 1. Frequency Distribution of Adolescents Characteristics at SMPN 3 Bekasi (n = 100).

Characteristics of Respondents	n	%
Age (years)		
12	7	7
13	29	29

14	44	44
15	19	19
16	1	1
Gender		
Male	54	54
Female	46	46

Based on Table 1, it can be seen that the ages of the respondents at SMPN 3 Bekasi, from a sample of 100 respondents, showed that most were at the age of 14, namely 44 students (44%). Regarding the sex characteristics of the males and females involved in this study, it was found that some of them had almost the same percentage, but the percentage of males were slightly higher than female, namely 54 students (54%).

Table 2. Frequency Distribution Sleep Duration of Adolescents at SMPN 3 Bekasi (n = 100).

Sleep Duration	n	%
Not good	91	91
Good	9	9

Based on Table 2, it can be seen that the 100 respondents in SMPN 3 Kota Bekasi in this study showed that the majority of respondents have sleep duration is not good (< 8.5 hours/day) as many as 91 students (91%).

Table 3. Frequency Distribution Emotional Eating of Adolescents at SMPN 3 Bekasi (n = 100).

Emotional Eating	n	%
High	48	48
Low	52	52

Based on Table 3, it can be seen that the 100 respondents in SMPN 3 Kota Bekasi in this study showed that the proportion high emotional eating and low emotional eating have almost the same percentage, but respondents who have low emotional eating (mean score 2.35) slightly more than high emotional eating as many as 52 students (52%).

Table 4. Frequency Distribution Over Nutrition of Adolescents at SMPN 3 Bekasi (n = 100).

Over Nutrition	n	%
Yes	24	24
No	76	76

Based on Table 4, it can be seen that the 100 respondents in SMPN 3 Kota Bekasi in this study showed that found that most of the respondents did not have over nutrition (≤ +1 SD), namely as many as 76 students (76%) and those included in the over nutrition category (> +1 SD), namely over nutrition (11 students) and obesity (13 students) with the percentage of respondents with over nutrition status of 24%.

3.2 Bivariate Analysis

Table 5. Relationship between Sleep Duration with Over Nutrition of Adolescents at SMPN 3 Bekasi (n = 100).

Sleep Duration	Over Nutrition				Total		p-value
	Yes		No				
	n	%	n	%	N	%	
Not Good	23	25,3	68	74,7	91	100	0,683
Good	1	11,1	8	88,9	9	100	

Fisher's Exact Test; Sig p<0,05

Based on Table 5, it can be seen that the results of the analysis of the relationship between sleep duration with over nutrition in adolescents at SMPN 3 Bekasi show that there were 23 students (25.3%) with poor sleep duration who had over nutrition status. Meanwhile, among students with good sleep duration, there was 1 student (11.1%) who had over nutrition status. Based on the results Fisher's Exact Test obtained p-values=0.683 (p>0.05) so that it can be concluded that there is no significant relationship between sleep duration and over nutrition in adolescents at SMPN 3 Bekasi.

Table 6. Relationship between Emotional Eating with Over Nutrition of Adolescents at SMPN 3 Bekasi (n = 100.

Emotional Eating	Over Nutrition				Total		p-value
	Yes		No				
	n	%	n	%	N	%	
High	11	22,9	37	77,1	48	100	0,807
Low	13	25	39	75	52	100	

Chi Square Test; Sig p<0,05

Based on Table 6, it can be seen the results of the analysis of the relationship between emotional eating with over nutrition in adolescents at SMPN 3 Kota Bekasi, it was found that there were as many as 11 students (22.9%) with emotional eating who have higher nutritional status. Meanwhile among students with emotional eating low, there were 13 students (25%) who had more nutritional status. Based on the results Chi Square Test obtained p-values=0.807

(p>0.05) so that it can be concluded that there is no significant relationship between emotional eating with over nutrition in adolescents at SMPN 3 Kota Bekasi.

4 DISCUSSION

The results of this study are same with the research of Badriyah and Pijaryani (2022) which states that there is no relationship between sleep duration and over nutrition (p=0.236) for high school students of the same level in Lenteng Agung Village, South Jakarta (SMKN 62 Jakarta, Wijaya Kusuma Vocational School, and Tourism Vocational High School). Indonesia). Supported by the results of A'ila's research (2019) that sleep duration is not related to over nutrition (p=0.456) in adolescents at the Situbondo Islamic boarding school. The results of Putri's et al. (2022) also stated that there was no relationship between sleep duration and nutritional status (p=0.313) in adolescents in Babelan.

Uncontrolled appetite can cause a person to consume excessive amounts of food, which can lead to over nutrition (Djafar and Sulistyowati, 2016). Control of one's appetite is regulated by neural mechanisms and humoral (neurohumoral) which is influenced by genetics, gender, food intake, environment, and psychological signals (Munajjah, 2020). Based on Nymo's et al. (2021) stated that there was no significant relationship between sleep duration and appetite (p>0.05). In this study blood samples were taken for hormone analysis related to appetite also taken during fasting and every 30 minutes for 2.5 hours (fasting state, and 30, 60, 90, 120 and 150 minutes, after breakfast). Plasma samples were analyzed for plasma concentrations of active hormone ghrelin, GLP-1, cholecystokinin (CCK), total peptide YY (PYY) and insulin.

Based on the results of this study, that there were differences in plasma ghrelin concentration levels in male and female, male with short sleep duration had increased active ghrelin and lower insulin. Meanwhile, female with short sleep duration had a higher decrease in active ghrelin and insulin. So from the research conducted by Nymo et al. (2021) stated that gender differences contribute to a person's short sleep duration resulting in a less significant effect on hormones that control appetite.

According to Harvard Health Publishing in 2021, if someone has a fast metabolism or fast BMR, they will burn a lot of calories at rest and during activities. (male have higher BMR than female), male burn more calories at rest so that it can help prevent an increase in BMI even though have a short sleep duration (Daulay and Akbar, 2021). Physical activity carried out in school-age children can reduce the risk of being overweight, obesity and other diseases (Wansyaputri et al., 2020). SMPN 3 Bekasi students are required to take part in extracurricular activities. Children in extracurricular activities will keep them active and energetic and reduce the risk of stress and obesity (Asmani, 2013). High physical activity can help maintain normal body weight even though sleeping for a short duration.

The results of this study are same with Purnama's research (2019) at the Mater Amabilis Catholic Vocational School in Surabaya, which states that there is no significant relationship between emotional eating with the nutritional status of adolescents (p=0.56). Supported by the results of research by Juzailah and Ilmi (2022) at SMK Negeri 41 Jakarta state that there is no significant relationship between emotional eating with BMI/A (p=0.642). Savitri's research (2019) at SMAN 104 Jakarta also states that there is no significant relationship between emotional eating with nutritional status (p=0.353).

According to Lestari et al (2017) stress can change a person eating behavior because when a person is under stress there will be a feeling of reluctance not to eat. According to Emond (2016) and Lee et al (2017) state that there is no relationship between emotional eating and over nutrition. A decrease in apetite is caused by the adrenal glands producing the epinephrine hormone is Corticothrophin Realeasing Hormone (CRP), which trigers the body respon to delay eating (Miliandani and Meilita, 2021).

Negative mood in adolescents don't always make them want to eat, but in this era to stress reduction, adolescents doing other activities such as playing social media and game online, According to Ministry of Communication and Informatic in 2023, social media users are 167 million people (60,4%) with an average daily duration of using social media 3 hours 18 minutes and game online users are 170 million people, users are dominated by adolescents. Carbonated sugary foods and drinks advertised on social media on smartphone has a high content of sugar, salt, energy, and fat consumed by many teenagers, resulting in unhealthy eating patterns (Gabriela et al., 2017). Poor eating patterns can increase BMI, causing over nutrition in adolescents (Gabriela et al., 2017).

5 CONCLUSION

The most of the respondents were aged 14 years (44%) and based on male and female sex, the percentage was almost the same, but the percentage of male gender was slightly higher than female, namely 54 students (54%). The majority of respondents had not good sleep duration (<8.5 hours/ day), as many as 91 students (91%). Respondents with high emotional eating and low emotional eating had almost the same percentage, but respondents who had low emotional eating (average score 2.35) were slightly more than high emotional eating, namely as many as 52 students (52%). Most of the respondents did not have over nutrition status (≤ +1 SD) namely as many as 76 students (76%). There is no significant relationship between sleep duration and nutrition more in adolescents at SMPN 3 Kota Bekasi with p-value = 0.683 (p>0.05). There is no significant relationship between emotional eating and over nutrition in adolescents at SMPN 3 Kota Bekasi with p- value = 0.807 (p>0.05).

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Assessing The Needs For Preventing Mental Health Disorders In Adolescent Girls At High Schools : Literature Review

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Keywords: Mental Health, Adolescent Girls, High Schools, Prevention, Needs Assessment

Abstract: Adolescent girls in high schools face unique challenges that can significantly impact their mental health. The transition from childhood to adulthood, academic pressures, peer relationships, and societal expectations can all contribute to the development of mental health disorders. Understanding the specific needs of this population is crucial for designing effective prevention strategies. A comprehensive search was conducted in various databases, including Google Scholar, Scopus and Science Direct using relevant keywords such as "mental health," "adolescent girls," "high schools," "prevention," and "needs assessment." Studies published in the last ten years were included to ensure up-to-date information.The comprehensive literature review yielded several pivotal insights concerning adolescent mental health. It elucidates that cyberbullying detrimentally impacts the social competencies of intercultural teenagers, necessitating preemptive actions and support systems. Moreover, successful interventions involving motivational interviews and peer group education were unveiled, fostering enhanced understanding of puberty and mental health in adolescent girls. The review emphasizes the imperative of specialized interventions for curbing non-suicidal self-injury within sexual minority youth and stresses the significance of prompt identification and intervention for mental health and substance use issues in youths with concurrent disorders. Ultimately, proactive measures are paramount in nurturing the well-being and mental health of young individuals contending with these multifaceted challenges, underlining the necessity for tailored interventions, early recognition, and preventive strategies across diverse demographics. The literature review emphasizes the significance of proactive approaches to prevent mental health disorders in adolescent girls at high schools. It highlights the need for targeted interventions, early identification, and support systems that consider the diverse challenges faced by different groups of adolescents. By implementing effective prevention strategies and providing appropriate mental health support, educators, parents, and mental health professionals can contribute to the overall well-being and mental health of adolescent girls in high school settings.

1 INTRODUCTION

In recent years, the issue of mental health among adolescents has garnered increasing attention due to its profound impact on overall well-being and development. The adolescent phase, marked by significant physical, emotional, and social changes, represents a critical period for the onset of mental health disorders. Among this vulnerable group, adolescent girls, in particular, face unique challenges that may contribute to the emergence of mental health concerns. High schools, as key environments for social interaction and academic growth, play a pivotal role in shaping the mental health landscape of adolescent girls(PBS, 2023). Recent data from the Centers for Disease Control and Prevention (CDC) highlights concerning trends about the mental health of U.S. high school students, with poor mental health in adolescence impacting many areas of a teen's life(Centers for Disease Control and Prevention, 2023). In particular, teen girls are suffering in unprecedented ways, with nearly three in five high school girls reporting feeling sad or hopeless in 2021, representing a 60% increase over the past decade (Srinivasan, 2021).

The present literature review delves into the crucial topic of assessing the needs for preventing mental health disorders in adolescent girls within high school settings. By comprehensively analyzing existing research, this review seeks to identify prevalent risk factors, protective factors, and gaps in

support systems that influence mental health outcomes in this demographic. Additionally, it aims to shed light on effective preventive strategies and interventions that high schools can implement to address the mental health needs of adolescent girls. Through an in-depth exploration of the literature, this review strives to provide valuable insights into the intricate interplay between developmental challenges, societal pressures, and mental health concerns faced by adolescent girls. By elucidating the multifaceted nature of these issues, it aspires to contribute to a broader understanding of the importance of early intervention and support mechanisms. As high schools increasingly recognize their role in nurturing not only academic excellence but also emotional well-being, this review underscores the significance of evidence-based practices that can foster resilience and mental wellness among adolescent girls.(AAUW, 2021)-(Threlfall *et al.*, 2017) Ultimately, the synthesis of existing literature presented in this review will serve as a foundation for informed decision-making by educators, policymakers, and mental health practitioners alike. By embracing a holistic approach to mental health, high schools can foster environments that empower adolescent girls to navigate challenges, build emotional resilience, and embark on a path towards a healthier and more fulfilling future.(Srinivasan, no date)(AAUW, no date)(WHO, 2021) By embracing a holistic approach to mental health, high schools can foster environments that empower adolescent girls to navigate challenges, build emotional resilience, and embark on a path towards a healthier and more fulfilling future.

2 SUBJECT AND METHOD

In July 2023, research publications were looked for in the Google Scholar, Scopus and Science Direct databases. The search strategy employed "(media OR (mental health)) AND (adolescent) AND (intervention)." Articles published between 2012 and 2022, publication in English among children, and genuine research were the inclusion criteria. Methods using both qualitative and quantitative data were covered. components that, using the Figure 1 technique, did not instantly grade the media on health issues among adolescents.

The assessment of collected articles involved a multi-stage process. Initially, a comprehensive search was conducted across reputable databases including Google Scholar, Scopus, and ScienceDirect, resulting in an initial count of 405 records. After removing duplicates, the dataset was refined to 390 records. These records underwent thorough screening, resulting in the inclusion of 146 records for further evaluation. After applying eligibility criteria, 37 full-text articles were assessed in detail. Subsequently, 23 articles were excluded based on specific criteria, leaving a final dataset of 10 articles for in-depth analysis and inclusion in the study.

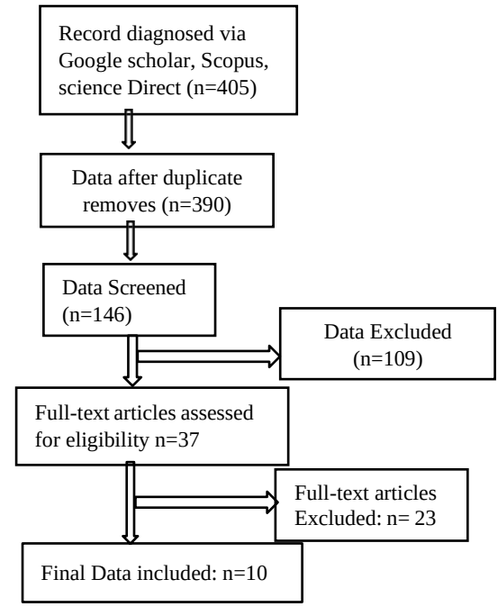

Figure 1: Prisma.

3 RESULTS

In order to accomplish its goals, this literature study groups similar extracts based on their measuring results using storytelling methodologies. Research journals that satisfy the requirements are then gathered and created in a journal summary that includes the researcher's name, the year the journal was published, the title of the study, the methodology, some sample data, and a summary of the findings. The table includes an overview of the research publication, and the contents of the study goals and findings are then examined. Analyze the content of the journal, parse and encode the content of the reviewed journal based on the outline or core of the study and then discuss it to draw conclusions.

The results of this journal search obtained as many as 10 journals on social support, mental health, and adolescents, consisting of 3 data based, namely google scholar, Scopus and SCIENCE DIRECT. Furthermore, a grouping of discussion themes was carried out in the form of : mental health, adolescent girls, high schools, prevention, needs assessment.

Journal searches taken for the last 10 years, from 2013 to 2023. The collected research sites were in Spanish, Iran India, United States, Norway. The types of research used in journals are correlational study, mixed method research, qualitative study, literatature review, crossectional, survey based study, Randomized contolled trial,systematic review, and experiential methods. The age of adolescents in this study was 10-24 years old, by taking sampling spots in schools, universities, or in adolescent groups. Journal summary results can be seen in table 1 as follows.

Table 1: Characteristics of Denotified Articles.

No	Article Title (Year and Name of Researcher)	Purpose	Methods and Samples	Findings
1	Correlational Study on Cyberbullying and Social Abilities in Intercultural Teenagers (2022, by M. Tomé-Fernández, J.M. Ortiz-Marcos, and C. Fernández-Leyva)(Tomé-Fernández, Ortiz-Marcos and Fernández-Leyva, 2022)	investigate the relationship between cyberbullying and social abilities among intercultural teenagers. As cyberbullying becomes an increasingly concerning issue in the digital age, this study aims to explore how cyberbullying experiences may impact the social abilities of intercultural teenagers, who face unique challenges due to their diverse cultural backgrounds.	Using quantitative research methods, the researchers conducted a correlational study. The study included intercultural teenagers aged 13 to 19 from various cultural backgrounds. Data was collected through self-report questionnaires administered in school settings, assessing cyberbullying experiences, social abilities, and relevant demographic	The findings of the study demonstrate the effectiveness of the mental health curriculum intervention using social media in improving the mental health literacy of adolescents. Participants in the intervention group show significant improvements in their knowledge of mental health, increased help-seeking behaviors, reduced stigma, and improved self-care practices compared to the control group. Qualitative data from interviews or surveys may provide additional insights into the participants' experiences, perceptions, and recommendations regarding the intervention.
2	Comparison of the Effect of Motivational Interview and Peer Group Education on Knowledge and Performance about Puberty and Mental Health in Adolescent Girls (Mohadi,2021)(Mohamadi *et al*., 2021)	The purpose of the study is compare the effectiveness of two different interventions, motivational interview and peer group education, in improving knowledge and performance related to puberty and mental health among adolescent girls. The study aims to assess which intervention yields better outcomes in enhancing understanding and promoting positive behaviors in these critical areas.	The motivational interview involved individual one-on-one sessions with participants, where a trained interviewer engaged in discussions aimed at promoting self-awareness, self-efficacy, and positive behavioral changes related to puberty and mental health. The peer group education, on the other hand, involved interactive group sessions led by trained peers or facilitators, where participants shared experiences and received information about puberty and mental health in a supportive and collaborative environment.	The research article presents the findings of the study, indicating the outcomes of the two interventions on the adolescent girls' knowledge and performance regarding puberty and mental health. It is not explicitly mentioned in the abstract what specific findings were obtained from the study. However, the results likely showed the effectiveness of both interventions in improving participants' understanding of puberty-related changes and mental health concepts.
3	Non-suicidal Self-Injury Among Sexual Minority Youth: An Etiological and Treatment Overview (2019, by L.C.	Explore the factors contributing to NSSI in sexual minority youth and provide insights into potential treatment	The researchers conducted a comprehensive overview of existing literature on non-suicidal self-injury among sexual minority youth. The study utilized a review and	The study concluded that early adolescent substance use is significantly associated with self-reported mental health problems in a non-clinical sample. The low utilization of mental health

	Smithee, B.W. Sumner, and R.A. Bean)(Smithee, Sumner and Bean, 2019)	approaches to address this concerning issue.	synthesis of previous research, including empirical studies, reviews, and theoretical frameworks. The samples analyzed in this article include studies focusing on sexual minority youth (i.e., those who identify as lesbian, gay, bisexual, or questioning their sexual orientation) and their experiences wit	services by adolescents with mental health challenges highlights the need for improved access to early identification and intervention to prevent the development of concurrent disorders. Addressing substance use and mental health issues at an early stage is crucial to promoting the well-being and mental health of young individuals.
4	Factors Associated with Depression among School-going Adolescent Girls in a District of Northern India: A Cross-sectional Study (2019, Shukla, M., Ahmad, S., Singh, J., Shukla, N., & Shukla, R.)(Gowda *et al.*, 2019)	Aims to identify and understand the factors linked to depression among adolescent girls attending schools in a district of Northern India. The research seeks to provide insights into the specific determinants contributing to depressive symptoms in this demographic.	Employing a cross-sectional design, the study collected data from adolescent girls attending schools within a specific district in Northern India. The researchers utilized structured questionnaires to gather information about various factors, including socio-demographic characteristics, family dynamics, academic stressors, peer relationships, and individual coping mechanisms. The study's sample size and selection process are not explicitly mentioned in the provided text.	The study's findings reveal significant insights into the factors associated with depression among school-going adolescent girls in the specified district of Northern India. The research identifies multiple variables, such as family conflict, academic pressure, poor peer relationships, and inadequate coping strategies, that are positively correlated with depressive symptoms. The study's outcomes underscore the complex interplay of environmental and individual factors in shaping the mental well-being of adolescent girls. This cross-sectional investigation contributes to a deeper understanding of the unique challenges faced by this demographic group and provides valuable information for the development of targeted interventions and support mechanisms.
5	Mental Health Services in the United States Public High Schools (2020, Shelton, A., & Owens, E.) (Aggarwal *et al.*, 2017)	Explores the provision of mental health services within public high schools in the United States. The study aims to provide insights into the availability, accessibility, and utilization of mental health support resources for students in this educational context.	Using a comprehensive approach, the researchers investigated mental health services in public high schools across the United States. The study involved data collection through surveys, interviews, and document analysis to assess the presence of mental health services, the range of services offered, collaboration between school and external mental health professionals, and the barriers to effective service delivery. The sample encompassed a diverse representation of public high schools across different regions of the United States.	The study's findings shed light on the landscape of mental health services in public high schools within the United States. It reveals variations in the availability and types of services offered, with some schools having comprehensive mental health support systems while others face challenges in providing adequate resources. Factors influencing the provision of mental health services include funding constraints, staffing limitations, and varying levels of collaboration with external mental health agencies. The research emphasizes the importance of addressing these barriers to ensure that students receive the necessary mental

				health support within their school environment.
6	Effects of exercise on mental health outcomes in adolescents: Findings from the CrossFit™ teens randomized controlled trial 2016 (Eather, Morgan and Lubans, 2016)	This research study aims to investigate the impact of exercise on mental health outcomes among adolescents. Specifically, it focuses on the effects of a CrossFit™ teens exercise program on various aspects of mental well-being.	he study employs a randomized controlled trial (RCT) design to examine the effects of exercise on mental health outcomes in adolescents. Participants are recruited from local schools and communities and randomly assigned to either an exercise intervention group or a control group. The exercise intervention involves participating in a structured CrossFit™ teens program, while the control group does not engage in the specific exercise regimen. Validated psychological assessment tools are used to measure various mental health outcomes such as mood, stress, self-esteem, and overall well-being. The study adheres to ethical guidelines and ensures participant safety throughout the trial.	he study's findings reveal the effects of exercise, specifically the CrossFit™ teens program, on mental health outcomes in adolescents. Participants engaged in the exercise intervention demonstrate improvements in mood, reduced stress levels, enhanced self-esteem, and an overall sense of well-being compared to the control group. These positive outcomes suggest that regular exercise, in the form of the CrossFit™ teens program, has a beneficial impact on the mental well-being of adolescents. The research underscores the potential of structured exercise interventions as a non-pharmacological approach to promote mental health and well-being in this demographic.
7	The impact of an educational mental health intervention on adolescents' perceptions of mental illness Sakellari 2014(Sakellari *et al.*, 2014)	Knowing the relationship of family-focused therapy (FFT) with decreased levels of mood episodes among young people at high risk for bipolar disorder (BD)	The study employs a pre-post intervention design to evaluate the impact of the educational mental health intervention. Participants are recruited from local schools and community centers and are divided into intervention and control groups. The intervention group receives a structured educational program that covers various aspects of mental health, including definitions, common mental disorders, treatment options, and dispelling myths. The control group does not receive this intervention. Surveys, interviews, and focus groups are used to gather data on participants' perceptions of mental illness before and after the intervention. The study's sample includes a diverse representation of adolescents from different backgrounds.	The study's findings reveal the significant impact of the educational mental health intervention on adolescents' perceptions of mental illness. Participants who underwent the intervention demonstrated improved understanding and knowledge about mental health issues, reduced stigma, and more positive attitudes towards seeking help for mental health concerns. The research highlights the potential of educational interventions to challenge misconceptions, reduce stigma, and promote a more informed and empathetic perspective on mental illness among adolescents. These findings have implications for the design and implementation of educational programs aimed at enhancing mental health awareness and promoting positive attitudes towards mental well-being.
8	The effect of peer education based on adolescent health education on the resilience of children	Knowing the effect of peer education based on adolescent health education on adolescent resilience	Experimental. The randomized controlled trial cluster of 1,613 students was divided into an intervention group (19 classes, 732 participants) and a control	Peer education based on adolescent health education has a significant effect on emotional adjustment (β = 1,766, P<0.001),

	and adolescents: A cluster randomized controlled trial(Tang *et al.*, 2022)		group (24 classes, 881 participants) ages 10-15.	total mental endurance (β= 5,391, P<0.001).
9	School-based prevention programs for depression and anxiety in adolescence: a systematic review 2014 (Corrieri *et al.*, 2014)	The review follows a systematic methodology, involving comprehensive searches across relevant databases such as PubMed, PsycINFO, and Education Resources Information Center (ERIC). Studies published within a specified timeframe are included, and rigorous inclusion and exclusion criteria are applied. The sample comprises a range of school-based prevention programs from various regions. The selected studies encompass both quantitative and qualitative research designs	This systematic review focuses on schoolbased prevention interventions on depression and anxiety disorders utilizing an RCT design, starting from the year 2000. Based on an online search (PubMed, Scirus, OVID, ISI) and bibliographi	The majority of the reviewed schoolbased interventions shows effectiveness in reducing or preventing mental disorders in adolescents. However, effect size computation revealed only small-scale effectiveness. Future studies have to consider the impact of program implementation variations.
10	Promoting positive social classroom environments to enhance students' mental health? Effectiveness of a school-based programme in Norway (Morin, 2022)	Examined whether the effectiveness of VIP partnerships on student happiness, depressive/joint anxiety symptoms, and loneliness was moderated by basic levels of social anxiety (no, low, and high).	Experimental. Participants were upper secondary school students from 10 exam schools (n=1101) and seven control schools (n=734) in Norway Ages 14-16	VIP partnerships (norwegian youth mental health programs) can help prevent mental health problems and loneliness by reducing risk factors such as social exclusion in the classroom

4 DISCUSSION

The presented table outlines a selection of research articles that collectively contribute to a deeper understanding of the mental health needs and challenges faced by adolescent girls in high school settings. These studies encompass a diverse range of purposes, methodologies, and findings, highlighting the multifaceted nature of the subject matter. The first article by Tomé-Fernández, Ortiz-Marcos, and Fernández-Leyva (2022) explores the relationship between cyberbullying and social abilities among intercultural teenagers. This study addresses the growing concern of cyberbullying's impact on the social well-being of adolescents with diverse cultural backgrounds. The researchers employ a quantitative correlational approach, revealing potential insights into how cyberbullying experiences may affect the social interactions and abilities of intercultural teenagers. That study addresses the growing concern of cyberbullying's impact on the social well-being of adolescents with diverse cultural backgrounds. Mohadi's study (2021) compares the effectiveness of motivational interviews and peer group education in enhancing knowledge and performance regarding puberty and mental health among adolescent girls. By utilizing individual interviews and group education, this research provides valuable insights into which intervention strategy yields better outcomes in promoting positive behaviors and understanding in these critical areas. Smithee, Sumner, and Bean (2019) conduct an overview of non-suicidal self-injury (NSSI) among sexual minority youth, aiming to explore contributing factors and potential treatment approaches. Through the synthesis of existing literature, this study informs the understanding of NSSI in a specific demographic, emphasizing the need for tailored interventions to address this concerning issue. Shukla et al.'s cross-sectional study (2019) delves into the factors associated with depression among school-going adolescent girls in Northern India. By examining a range of factors such as family dynamics, academic stressors, and coping mechanisms, the researchers shed light on the complex interplay that contributes to depressive symptoms in this demographic. Shelton and Owens (2020) investigate mental health services within U.S. public high schools, uncovering variations in the availability and types of services offered. This study underscores the importance of addressing barriers to ensure effective mental health support for students in an educational context. The study by unidentified researchers (2016) examines the effects of exercise on mental health outcomes in adolescents, specifically focusing on the CrossFit™ teens exercise program. This randomized controlled trial demonstrates the positive impact of structured exercise interventions on mood, stress levels, self-esteem, and overall well-being among adolescents. Sakellari's study (2014) assesses the impact of an educational mental health intervention on adolescents' perceptions of mental illness. Through pre-post intervention evaluations, this research demonstrates the potential of educational interventions to challenge misconceptions, reduce stigma, and promote a more empathetic perspective on mental health among adolescents. Furthermore, two additional studies contribute to the discussion. One investigates the effect of peer education based on adolescent health education on adolescent resilience (unspecified researcher, 2013), highlighting the positive impact on emotional adjustment and mental endurance. Another systematic review (2014) examines the effectiveness of school-based prevention programs for depression and anxiety, revealing the overall efficacy of interventions in reducing or preventing mental disorders. Lastly, the research on promoting positive social classroom environments in Norway (2016) emphasizes the significance of VIP partnerships in preventing mental health problems and loneliness by reducing risk factors such as social exclusion in the classroom. Collectively, these studies highlight the importance of addressing mental health needs among adolescent girls in high school settings through tailored interventions, comprehensive approaches, and a deeper understanding of contributing factors. The findings contribute to the development of effective strategies to support the mental well-being of this vulnerable demographic.

5 CONCLUSION

The literature review emphasizes the significance of proactive approaches to prevent mental health disorders in adolescent girls at high schools. It highlights the need for targeted interventions, early identification, and support systems that consider the diverse challenges faced by different groups of adolescents. By implementing effective prevention strategies and providing appropriate mental health support, educators, parents, and mental health professionals can contribute to the overall well-being and mental health of adolescent girls in high school settings

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FORMULATION OF CARROT MEATBALLS AS A FUNCTIONAL FOOD INNOVATION HIGH IN VITAMIN A (*β-carotene*) (A- review)

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Keywords: β-carotene, meatball, functional food, vitamin A, carrot

Abstract: B- carotene is derivated of Vitamin A reflection by plant color, especially red, orange, and yellow. Carrot meatball is development with an innovation by substitution of a local food (carrot) that is expected to increase vitamin A in a food product and increase a vegetable consumption particularly. The method on this study is used the literature review method by collecting data based on existing research. The results obtained based on the food formulation table, show that all formulations successfully met the claims of carrot meatballs with high vitamin A. With *β-carotene* levels above 360 mcg in each formulation. Carrot meatballs can fulfill the claim of meatballs with high levels of Vitamin A.

1 INTRODUCTION

Food has three functions, including:

1. Conventional: as a provider of energy and nutrition
2. Secondary: sensory properties of food
3. The third function is not based on the nutritional content contained in food but on other healthy components (Danar et al., 2021).

Functional foods have a very long history. At the end of the 1980s, it was considered that Japan was the country where the concept of functional food was born (Jaddu et al., 2018). In Japan, FOSHU or “Food for Specified Health Uses” was established in 1991 and the amount of production increased in 1997 – 2007 . The definition of FOSHU is based on the Ministry of Health and Welfare of Japan, namely (Jaddu et al., 2018):

1. Foods that are expected to have certain health benefits because of the relevant constituents or foods that have had allergenic components removed.
2. Foods with increased or diminishing effects that have been scientifically evaluated and for which permission has been granted to form favorable health claims are expected to be consumed.

The term "functional food" first appeared in a nature news magazine entitled "Japan Explores the Boundaries between Food and Medicine" in 1993. There are several definitions related to functional food, including the following (Jaddu et al., 2018):

1. Health Canada (2000): states that functional foods are similar to conventional foods consumed as part of the usual diet, with demonstrated physiological benefits, and/or to reduce the risk of chronic disease beyond basic nutritional functions
2. International Food Information Council (IFIC): Foods or dietary components that may provide health benefits beyond basic nutrition.
3. The International Life Sciences Institute of North America (ILSI): foods that by virtue of physiologically active food components provide health benefits beyond basic nutrition

Indonesia is known as an agricultural country that produces very high yields of fruits and vegetables including carrots (Lidiyawati et al., 2013). Carrot (Daucus carota) is a type of vegetable that is high in beta carotene (Ahmad et al., 2019). Beta carotene is an important pro-vitamin A which is a source of vitamin A in the digestive tract, especially the small intestine (Gumolung, 2017). Then vitamin A will undergo an absorption process before being stored in the liver for all the body's metabolic reactions. And in

the liver cells b-carotene is converted to vitamin A. The meaning of carotenoids are compound that has conjugated double bonds, and is very reactive in nature, and acts as an antidote to free radicals or commonly referred to as antioxidants (Agustina et al., 2019). The color density of plants that contain beta carotene can indicate the amount of beta carotene in these plants (Agustina et al., 2019). Based on the Indonesian Food Composition Table (TKPI), 100 grams of carrots contain around 3784 beta carotene and 7125 total carotene.

Carrots have many health benefits. Carrots are very well known for maintaining eye health so that vision remains clear. It is also a vegetable with antioxidants that can function as a prevention against several degenerative diseases. Among them is the prevention of neurogenerative disease, cardiovascular and cancer (Ahmad et al., 2019). Carrots also contain vitamin C, vitamin E, and vitamin B which are good for the body. In addition, carrots are also good for maintaining healthy skin and function as anti-aging. Carrots are included in vegetables with good fiber content to help the process of digesting food in the body and being able to overcome constipation. Carrots can also function as a blood sugar control. And consuming foods containing b-carotene can prevent plaque or cholesterol from forming in blood vessels (Sari & Mayasari, 2018).

Meatballs are gel products made from processed protein derived from meats such as beef, chicken, and fish (Purnomo & Swasono, 2020). But, the ingredients of Meatballs are easily damaged due to their high protein and water content. Meatballs have a pH that tends to be neutral(Purnomo & Swasono, 2020). The addition of carrots to meatballs is proven to prevent rancidity in food caused by air and microorganisms such as yeast and mold, this is due to the antioxidant effect found in carrots. In addition, the addition of carrots to processed meatball products can increase consumer appeal because of the resulting color(Hidayati, 2020).

2 OBJECTIVE

Innovation on the carrot meatball menu aims to increase the amount of vitamin A intake in the body and increase consumer preference for carrot consumption which is often avoided due to the taste. Other than that, carrot meatballs are an innovation with affordable prices to reach the wider community.

3 METHODS

3.1 Tools and materials

The tools in this study is used Google Scholar with keywords *"*meatballs, chicken meat " and " carrot flour" in the range 2013 – 2020. Other than that, we are used TKPI (Indonesian Food Composition Table) and Indonesian Food and Drug Authority.

3.2 Research methods

This study uses the literature review method collecting data based on Journal by Google Scholar in the range 2013 – 2020. With substituting carrot and chicken meat of the formulation to get the level of beta carotene and claiming the product as a carrot meatball high in vitamin A. The ratio of carrot and chicken meat must be consistent. For example 1:1 or 3:1.

4 RESULTS

Based on the results of the literature review, an example of a functional food product formulation is the manufacture of meatball products with carrot substitution to achieve claims for food products high in vitamin A (b-carotene). The design for making meatball products is presented in Figure 1. The flowchart of the research implementation is as follows.

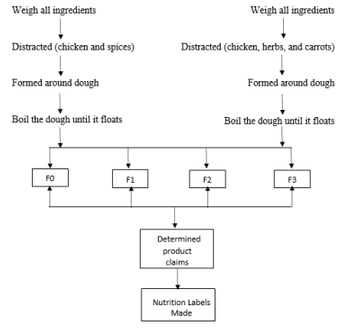

Figure 1: Research Implementation Flowchart.

Product formulations are presented in Table 1.0 Carrot Meatball Formulation as follows:

Table 1.0: Formulation.

Ingredient	Formulation			
	Control	F1	F2	F3
Carrot	0	250	350	500
Chicken Meat	500	250	150	0
Tapioca Flour	150	150	150	150
Water	100	100	100	100
Egg Whites	65	65	65	65
Garlic	16	16	16	16
Red onion	15	15	15	15
Papper	2	2	2	2
Salt	7.5	7.5	7.5	7.5
Powder Broth	7.5	7.5	7.5	7.5
Total	863	863	863	863
Total Vitamin A per 100 grams	0.03	876.97	1227.71	1695.51

In this table, we can see how many ingredients that we used to make this meatball.

Table 1.1: Control Formulation (F0).

Ingredient	Size (g)	Calories (g)	Protein (g)	Fat (g)	Carb (g)	B- Car (µg)
Carrot	0	-	-	-	-	-
Chicken Meat	500	864.2	52.78	72.5	-	-
Tapioca Flour	150	552	1.65	0.75	132.3	-
Water	100	-	-	-	-	-
Egg Whites	65	28.9	6.24	-	0.46	-
Garlic	16	17.9	0.72	0.032	3.7	-
Red onion	15	6.9	0.225	0.045	1.38	0.3
Papper	2	27.375	0.86	0.51	0.682	-
Salt	7.5	-	-	-	-	-
Powder Broth	7.5	-	-	-	-	-
Total	863	149.275	62.475	73.84	138.47	0.3
Content per-100 gram		17.3	7.24	8.56	16.04	0.03

The table above is F0 or the control formulation table. There is no substituting carrots to the meatball formulation. The levels of b-carotene are only obtained from other sources of ingredients which are very low.

Table 1.2: Formulation 1.

Ingredient	Size (g)	Calories (g)	Protein (g)	Fat (g)	Carb (g)	B- Car (µg)
Carrot	250	72	2	1.2	15.8	7568
Chicken Meat	250	432.1	26.39	36.25	-	-
Tapioca Flour	150	552	1.65	0.75	132.3	-
Water	100	-	-	-	-	-
Egg Whites	50	22.25	4.81	-	0.356	-
Garlic	16	15.75	0.63	0.028	3.25	-
Red onion	15	6.21	0.202	0.04	1.242	0.27
Papper	2	27.375	0.86	0.51	0.682	-
Salt	7.5	-	-	-	-	-
Powder Broth	7.5	-	-	-	-	-
Total	863	1127.7	36.51	38.8	153.63	7568.27
Content per-100 gram		130.67	4.23	4.495	17.8	**876.97**

On the table above, 250 grams of carrots have been substitude to the meatball formulation or with a comparison of carrots: chicken: tapioca flour sequentially, namely 5: 5: 3. And on the table, a significant increased of b-carotene levels has been seen.

Table 1.3: Formulation 2.

Ingredient	Size (g)	Calories (g)	Protein (g)	Fat (g)	Carb (g)	B- Car (µg)
Carrot	350	100.8	2.8	1.68	22.12	10595.2
Chicken Meat	150	259.26	15.83	21.75	-	-
Tapioca Flour	150	552	1.65	0.75	132.3	-
Water	100	-	-	-	-	-
Egg Whites	65	28.9	6.24	-	0.46	-
Garlic	16	15.75	0.63	0.03	3.25	-
Red onion	15	6.21	0.202	0.04	1.242	0.27
Papper	2	27.375	0.86	0.51	0.682	-
Salt	7.5	-	-	-	-	-
Powder Broth	7.5	-	-	-	-	-
Total	863	990.3	28.212	24.76	160.054	10595.47
Content per-100 gram		114.75	3.27	2.87	18.55	**1227.71**

The table above, b-carotene levels have been significantly increased after substituting 350 grams of carrot in the meatball formulation. With a ratio of carrots: chicken: tapioca flour sequentially, namely 7: 3: 3.

Table 1.4: Formulation 3.

Ingredient	Size (g)	Calories (g)	Protein (g)	Fat (g)	Carb (g)	B- Car (µg)
Carrot	500	144	4	2.4	31.6	14632
Chicken Meat	0	-	-	-	-	-
Tapioca Flour	150	552	1.65	0.75	132.3	-
Water	100	-	-	-	-	-
Egg Whites	65	28.9	6.24	-	0.46	-
Garlic	16	15.75	0.63	0.28	3.25	-
Red onion	15	6.21	0.202	0.04	1.24	0.27
Papper	2	27.4	0.86	0.51	0.682	-
Salt	7.5	-	-	-	-	-
Powder Broth	7.5	-	-	-	-	-
Total	863	774.26	13.58	3.98	169.532	14632.3
Content per-100 gram		89.72	1.57	0.46	19.64	**1695.51**

The table above, b-carotene levels have been significantly increased after adding 500 grams of carrots. In this formulation, we aren't using chicken meat.

5 DISCUSSION

Information and Terms for Product Claims:

- Based on ALG the need for vitamin A in the general category is 600 µg or equivalent to 1.200 µg of beta carotene.
- As a source vitamin A product, it requires 180 µg of beta carotene per 100 grams size of the product.
- And 360 µg beta carotene as a product high in vitamin A.
- Formula: 15% × (600 × 2) × 2 = 360 µg beta carotene.

Components of Nutritional and Non-Nutritional Substances Contained in Each Formula Weighing 100 Grams:

1. Table F0 In this table the composition of carrots : chicken meat : tapioca flour is sequentially 0 : 500 : 150. With 0.03 µg beta carotene, 149.3 kcal energy, 17.3 grams fat, 16.04 grams carbohydrates, and 7.2 grams protein.
2. Table F1 In this table the composition of carrots: chicken meat: and tapioca flour sequentially is 5: 5: 3. With 876.97 µg beta carotene, 130.7 kcal energy, 4.5 grams fat, 17.8 grams carbohydrates and 4.23 grams protein.
3. Table F2 In this table the composition of carrots: chicken meat: and tapioca flour is sequentially 7 : 3 : 3. With 1227.71 µg beta carotene, 114.75 kcal energy, 2.9 grams fat, 18.5 grams carbohydrates and 3.3 grams protein.
4. Table F3 In this table the composition of carrots: chicken meat: and tapioca flour sequentially is 500: 0: 150. With 1695.51 µg beta carotene, 89.72 kcal energy, 0.46 gram fat, 19.64 gram carbohydrate, and 1.57 gram protein.

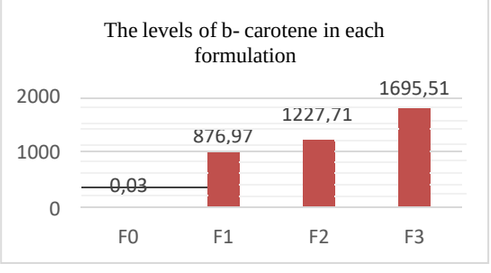

Figure 2: The Levels of B- Carotene Before and After Substituting Carrot.

Based on the graph above, it can be seen that the levels of b-carotene in each formulation experienced a significant and stable increase. And there is no decrease in b-carotene levels in each formulation. Due to limitations in the digestive ability of the human body, it is recommended to consume carrots that have been boiled beforehand(Agustina et al., 2019). However, there was no significant difference between the levels of b-carotene in raw carrots and boiled carrots. And consuming steamed carrots can increase the absorption of b-carotene in the body (Ferantika et al., 2020).

Product Claims and Labels

Carrot meatballs can fully claim a functional food product with high Vitamin A. This is because the beta-carotene content in each formulation is more than 360 µg. So this product can be labeled as Carrot Meatballs High in Vitamin A.

6 CONCLUSIONS

The carrot meatball menu is able to fulfill the claim as a meatball with high levels of Vitamin A which is efficacious and has many benefits for the body. In addition, carrot meatballs can be used as a functional food breakthrough at an affordable price.

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PERATURAN KEPALA BADAN PENGAWAS OBAT DAN MAKANAN REPUBLIK INDONESIA NOMOR 9 TAHUN 2016 TENTANG ACUAN LABEL GIZI

PERATURAN KEPALA BADAN PENGAWAS OBAT DAN MAKANAN REPUBLIK INDONESIA NOMOR 1 TAHUN 2022 TENTANG PENGAWASAN KLAIM PADA LABEL DAN IKLAN PANGAN OLAHAN

TABEL KOMPOSISI PANGAN Indonesia TAHUN 2020. DIREKTORAT JENDERAL KESEHATAN MASYARAKAT DIREKTORAT GIZI MASYARAKAT 2018.

DETERMINANTS AFFECTING TO COVID-19 VACCINES ACCEPTANCE IN ASIA: A META-ANALYSIS STUDY

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Keywords: Asia, Booster, Determinant, Vaccine COVID-19.

Abstract: COVID-19 has subsided, but it does not rule out the possibility that other infectious diseases will emerge. Policy preparations for handling infectious disease outbreaks must be reviewed in more depth. One of the factors that needs to be studied is how people's attitudes towards receiving vaccines, because vaccines are the most important treatment in disease outbreak conditions. The current study attempts to systematically review, summarize, and meta-analyse the determinants of acceptance of the COVID-19 vaccine in Asia. The method used in this study is meta-analysis, in which the researcher formulates research questions, then selects relevant studies based on predetermined exclusion and inclusion criteria. The database that the researchers collected from January 2020 to June 2022. The next stage is to collect and analyse the data obtained, data were analysed using meta-analysis software and systematic review. The final stage is interpreting the results of the meta-analysis. The factor of receiving a vaccine may vary, but in this study a person's level of education has a higher chance of receiving a vaccine than the other 2 factors, namely income level and education level. Increased acceptance of vaccines can be increased by providing education to the public on a massive and ongoing basis regarding the benefits of vaccines in infectious disease outbreaks.

1 INTRODUCTION

The spread of Covid-19 has become a serious public health problem since 2020. In June 2022 there were more than 500 million confirmed cases of the SARS CoV-2 virus, with 6 million deaths worldwide. Southeast Asia accounts for more than 10% of the world's total (WHO, 2022). Covid-19 not only has a big health impact, but also has a significant economic impact. The Covid-19 pandemic has caused a decline in state revenues from various sectors and led to an increase in the number of unemployed worldwide (Nicola M, 2020). This negative impact has prompted several pharmaceutical companies to produce vaccines as soon as possible. By the end of 2020, several vaccines to prevent Covid-19 infection had been approved and there were more than 50 potential Covid-19 vaccines in production (Tregoning JS, 2020). Vaccination programs have started in several countries around the world, including booster vaccines that have been carried out. Despite this, people continue to have concerns about the safety and effectiveness of vaccines, including the effects of immunity, because there are many cases of people being infected despite having used the vaccine (SeyedhAlinaghi S, 2020). In addition, the rapid production of vaccines raises concerns about their efficacy. Vaccine production is associated with harmful effects (Cardenaz G, 2014).

In the relentless battle against the global COVID-19 pandemic, vaccination stands as one of the most powerful tools at our disposal (El-Elimat *et al.*, 2021). However, the success of vaccination campaigns relies heavily on public acceptance and willingness to receive the vaccine. The decision to accept or decline a vaccine is influenced by a myriad of factors, ranging from individual beliefs and attitudes to broader societal and cultural dynamics (Cooper *et al.*, 2021). This meta-analysis embarks on a comprehensive exploration of the determinants that shape COVID-19 vaccine acceptance, utilizing a systematic review of existing research to uncover patterns and insights that can guide public health strategies. By shedding light on the diverse factors that impact vaccine acceptance, this study aims to contribute to the development of targeted interventions and communication efforts, ultimately fostering a more effective global vaccination campaign (Troiano and Nardi, 2020).

Understanding the complex interplay of determinants that influence vaccine acceptance is crucial for achieving widespread immunity and controlling the spread of the virus(El-Elimat *et al.*, 2021). While vaccines offer a beacon of hope, their efficacy is limited if a significant portion of the population remains hesitant (Al-Ayyadhi *et al.*, 2021). This analysis synthesizes findings from a diverse range of studies, including those examining education level factors, income, and socioeconomic disparities. By pooling this wealth of information, we aim to provide a holistic view of the intricate factors that underpin vaccine acceptance decisions, enabling policymakers and healthcare providers to tailor their strategies to address these determinants effectively.

In conclusion, this meta-analysis serves as a comprehensive effort to unravel the complex fabric of determinants that impact the acceptance of COVID-19 vaccines. By aggregating insights from a

Multitude of studies, we aim to illuminate the path towards a more informed and effective public health approach. COVID-19 may be decrase, but the new challenger will come. A deeper understanding of these acceptance determinants is an important asset for dealing with the new global crisis due to infectious disease (Holst, 2020).

2 METHOD

This study uses a systematic review study and meta-analysis. The articles in this study were obtained from databases including PubMed, Science Direct, and Google Scholar. Search with keywords (“determinant of covid 19 acceptant” OR “decision making on covid19 vacion acceptant” OR “covid 19 vaccination acceptant”) AND (ASIA OR ASIAN) AND AOR AND income AND age AND occupation AND education. Articles were selected based on inclusion and exclusion criteria. The inclusion criteria are full text articles; the interventions given are education, age, income, and occupation; the outcome of the article is the acceptance of vaccinations; and analysis using multivariate with Adjusted Odds Ratio (AOR). While the exclusion criteria are articles that use languages other than English, populations other than Asian people. Article search was carried out by considering the eligibility criteria determined using the PICO model. The population in this study is the ASIA community with higher education interventions, adult age, high income, and employment as students with the outcome of receiving the COVID-19 vaccination. The process of searching for articles through databases with journals found 10 articles. Assessing the quality of articles using the Critical Appraisal Checklist for Cross Sectional Study with CEBMa. The process of searching for articles through databases with journals found 10 articles. Assessing

the quality of articles using the Critical Appraisal Checklist for Cross Sectional Study with CEBMa.

3 RESULTS AND DISCUSSION

Asia is the continent that has the largest population, apart from that it is also on this continent that the first case of COVID-19 was found, specifically in China. The spread of the covid-19 virus in Asia is very high with several cases of more than 60 million at the end of 2022(WHO, 2022). There are 9 out of 48 countries in Asia included in this study which is included in the largest population in Asia (see table 1).

The government's strategy for preventing the spread of the COVID-19 virus is health protocols and vaccination. The success of vaccination depends on the acceptance of the population and coverage. To accomplish this, it is important for the government and health workers to know what are the determinants that affect vaccine acceptance.

3.1 Education Level

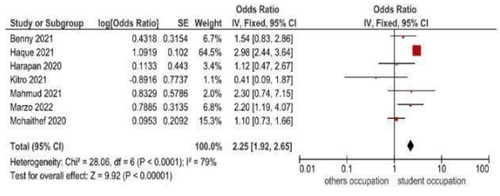


Figure 1. Meta analysis forest plot of the effect of education level on acceptance of the Covid-19 vaccination.

Meta-analysis of the results of Figure 1 shows the value of heterogeneity I2 = 79%, the analysis model used is random effect. The forest plot shows that people with a high level of education have the potential to increase acceptance of the Covid-19 vaccination by 2.25 times compared to people with low and/medium education levels and these results are statistically significant (aOR = 2.25; 95% CI = 1.92 – 2.65; p < 0.00001). This data is in accordance with other studies which mention that education level is one of the factors causing vaccine acceptance (Patwary *et al.*, 2021), (King, Heidler and Marzo, 2021), (Haile *et al.*, 2022). The examination of education level as a determinant of COVID-19 vaccine acceptance, as revealed in this meta-analysis, offers a comprehensive understanding of how knowledge and information influence individuals' attitudes towards vaccination. The findings highlight a nuanced relationship between education and vaccine acceptance, shedding light on both overarching trends and notable intricacies.

Our analysis underscores a positive correlation between higher education levels and increased vaccine acceptance. This connection can be attributed to several factors. Individuals with higher education are likely to have greater access to accurate and scientifically validated information, allowing them to make informed decisions about vaccines (Cordina, Lauri and Lauri, 2021).

Education also tends to foster critical thinking skills, enabling individuals to assess the credibility of sources and navigate through the barrage of information available in the digital age (Höttecke and Allchin, 2020).

However, the picture is not uniform across all education levels. Our findings reveal disparities within lower education brackets, where vaccine acceptance can vary significantly. Factors such as misinformation, lack of health literacy, and limited exposure to accurate sources of information can contribute to vaccine hesitancy in these groups (King, Heidler and Marzo, 2021). Addressing these barriers requires targeted educational campaigns that present evidence-based information in an accessible and culturally sensitive manner (Romer *et al.*, 2009).

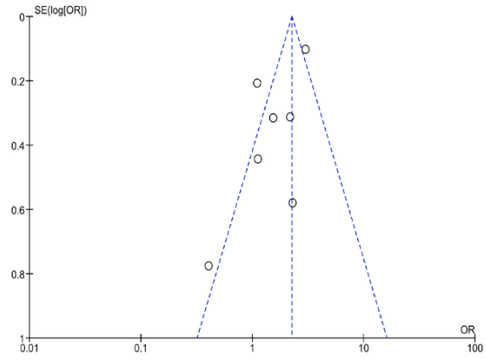


Figure 2. Meta-analysis of the funnel plot of the effect of education level on acceptance of the Covid-19 vaccination shows that there is a publication bias which is characterized by an overestimation effect which is characterized by an asymmetrical distribution between plots, 1 plot on the right, 4 plots on the left, and 2 plots touching the vertical line.

The analysis also emphasizes the role of education in mitigating vaccine misinformation. Well-educated individuals are more likely to recognize and reject false claims, making them less susceptible to conspiracy theories and misinformation that can fuel

vaccine hesitancy (Wonodi *et al.*, 2022). Moreover, education intersects with socioeconomic factors, with individuals from lower education backgrounds often belonging to lower income groups (Morales, Beltran and Morales, 2022). This intersection suggests that interventions aimed at increasing vaccine acceptance should consider both educational and financial barriers.

In conclusion, education level emerges as a significant determinant of COVID-19 vaccine acceptance, reflecting a complex interplay between knowledge, critical thinking, and access to credible information (Al-Mohaithef and Padhi, 2020). While higher education tends to correlate with greater vaccine acceptance, addressing disparities within lower education groups is crucial for fostering widespread immunity. Tailored educational campaigns, coupled with efforts to counter misinformation, can bridge gaps in vaccine acceptance and contribute to a more informed and resilient global response to the pandemic (Sallam, 2021)

3.2 Age

The meta-analysis of the results of Figure 3 shows a heterogeneity value of I2 = 87%, the model analysis used is random effect. The forest plot shows that people of mature age have the potential to increase their acceptance of COVID-19 vaccinations by 1.03 times compared to people of ages other than adults and these results are not statistically significant (aOR= 1.03; CI 1.01 – 1.05; p = 0.005).

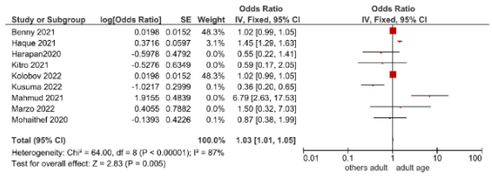


Figure 3. Forest plot meta-analysis of the effect of age on acceptance of the Covid-19 vaccination.

The findings of this meta-analysis reveal compelling insights into the role of age as a determinant of COVID-19 vaccine acceptance. Age has been consistently recognized as a significant factor influencing vaccine decisions, with variations across different age groups (Saidur, Khan and Watanapongvanich, 2021). Our analysis demonstrates that older individuals tend to exhibit higher levels of vaccine acceptance compared to younger cohorts. This trend is often attributed to a greater susceptibility to severe illness among older adults, which underscores the importance of vaccination as a protective measure. Additionally, older generations may have lived through past vaccine-preventable outbreaks, leading to a heightened awareness of the benefits of immunization (Phadke *et al.*, 2016).

However, a noteworthy observation is the variability within younger age groups. While some younger individuals are eager to receive the vaccine, others display higher levels of hesitancy. This divergence may be driven by factors such as concerns about vaccine side effects, perceptions of invulnerability to severe illness, and a reliance on information sources that may not provide accurate or balanced information (Nguyen *et al.*, 2021). Targeted campaigns addressing these concerns and dispelling misinformation can play a crucial role in increasing vaccine acceptance among these segments.

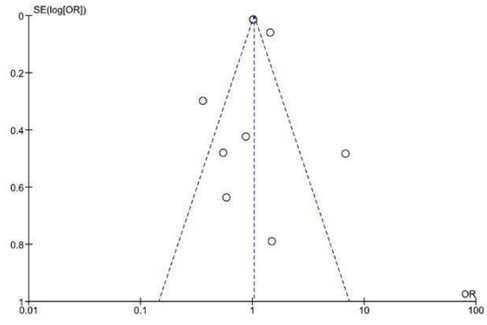


Figure 4. Meta-analysis of the funnel plot of the effect of age on acceptance of the Covid-19 vaccination shows that there is a publication bias which is characterized by an overestimate effect which is characterized by an asymmetrical distribution between plots, 3 plots on the right, 4 plots on the left, and 1 plot touching the vertical line.

The influence of age intersects with cultural and socioeconomic factors (Morales, Beltran and Morales, 2022). Older individuals from culturally diverse backgrounds might have different attitudes towards vaccines due to historical experiences, beliefs, and healthcare access. Younger individuals, on the other hand, might be influenced by social media and peer interaction (Choukas-Bradley Sophia, 2018). As such, tailored strategies for specific age cohorts are essential. For instance, educational programs aimed at younger individuals can address their unique concerns and provide evidence-based information to counter misperceptions.

Furthermore, the analysis underscores the significance of intergenerational communication. Older family members can play a pivotal role in

encouraging younger family members to get vaccinated (CDC, 2022). This highlights the importance of considering family dynamics and support systems when designing interventions to enhance vaccine acceptance across all age groups.

In conclusion, age emerges as a crucial determinant of COVID-19 vaccine acceptance, reflecting a complex interplay of psychological, cultural, and generational factors (Ma *et al.*, 2023). Recognizing the heterogeneity within age groups and understanding the dynamics that shape vaccine attitudes is pivotal in crafting effective communication strategies and interventions. This meta-analysis underscores the need for nuanced, age-specific approaches to address hesitancy and foster a collective commitment to global health.

3.3 Income

Meta-analysis of the results of Figure 5 shows a heterogeneity value of I2 = 96%, the analysis model used is random effect. The forest plot shows that people with high incomes have the potential to increase their acceptance of COVID-19 vaccinations by 1.52 times compared to people with low and/medium incomes and these results are statistically significant (aOR = 1.52; 95% CI = 1.29 - 1.80); p < 0.00001.

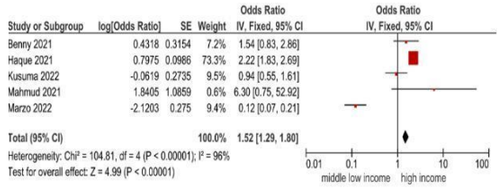
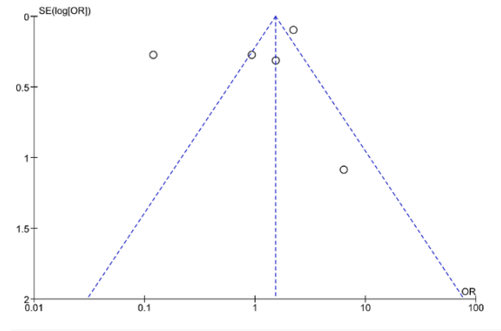


Figure 5. Forest plot meta-analysis of the effect of income on acceptance of the Covid-19 vaccination.

The examination of income as a determinant of COVID-19 vaccine acceptance through this metaanalysis offers a comprehensive understanding of how socioeconomic status influences vaccination attitudes (Wirawan *et al.*, 2022). Our findings highlight a significant correlation between income levels and vaccine acceptance, revealing both important trends and complexities. It is evident that individuals with higher income tend to demonstrate greater vaccine acceptance. This alignment can be attributed to several factors. First, individuals with higher income often have better access to healthcare resources, enabling them to access accurate information about vaccines from credible sources (McMaughan, Oloruntoba and Smith, 2020). Second, a higher socioeconomic status might correlate with higher educational attainment (Lurie, 2021), fostering a better understanding of the benefits and importance of vaccination (Rodrigues and Plotkin, 2020).

However, this analysis uncovers a multifaceted landscape within income groups. Lower-income individuals exhibit varied vaccine attitudes, influenced by factors such as mistrust in healthcare systems, lack of access to reliable information, and concerns about vaccine affordability and accessibility (Kricorian, Civen and Equils, 2022). This heterogeneity suggests that addressing vaccine hesitancy within lower-income communities



requires targeted interventions that address specific barriers, including financial constraints and limited access to healthcare facilities.

Figure 6. Meta analysis of the funnel plot of the effect of income on acceptance of the Covid-19 vaccination shows that there is a publication bias which is characterized by an overestimate effect which is indicated by 1 plot touching the vertical line.

Moreover, the impact of income on vaccine acceptance is intertwined with cultural, geographical, and educational factors. People in lower-income brackets may come from diverse cultural backgrounds, each with its own set of beliefs and perceptions about vaccines. Tailoring communication efforts to address these cultural nuances is essential to effectively reach these communities. Interestingly, this analysis also underscores the potential role of economic incentives in increasing vaccine acceptance among lower-income individuals. Financial incentives, such as vouchers or subsidies, could help alleviate concerns about vaccine cost and accessibility, potentially bridging the gap in vaccine acceptance between different income groups.

In conclusion, the influence of income on COVID-19 vaccine acceptance is intricate and multi-dimensional. While a positive correlation between higher income and vaccine acceptance is evident, the

dynamics within lower-income communities are more nuanced. Crafting targeted strategies that address financial barriers, provide reliable information, and consider cultural sensitivities can bridge disparities in vaccine acceptance across income groups. This metaanalysis underscores the necessity of holistic approaches to ensure equitable vaccine distribution and uptake, as we strive for global health protection against the pandemic.

4 CONCLUSIONS

In conclusion, while income, age, and education level are important determinants of vaccine acceptance, the relationship is multifaceted. Higher income levels, older age, and higher education tend to correlate with higher vaccine acceptance due to improved access to information, personal experiences, and critical thinking skills. However, other factors such as cultural beliefs, religious considerations, and exposure to misinformation can also play a significant role in shaping individuals' attitudes towards vaccines. Public health campaigns, accurate information dissemination, and open communication are essential in addressing vaccine hesitancy and fostering widespread vaccine acceptance across all demographic groups.

5 CONFLICT OF INTEREST

If any, should be placed before the references section without numbering

Table 1. Description of the primary studies.

Authors (Year)	Country	Sample	Population	Intervention	Comparison	Outcomes
Haque et al (2021)	Bangladesh	7357	Adult society of Bangladesh	High Education Level Mature age Student work High income	Low and / moderate education level Age other than maturity Jobs other than students Low and / medium income	Acceptance of COVID-19 vaccination
Marzo et al (2022)	Malaysia	490	Malaysians over 18 years of age	High Education Level Mature age Student work High income	Low and / moderate education level Age other than maturity Jobs other than students Low and/ medium income	Acceptance of COVID-19 vaccination
Mohithef et al (2020)	Saudi Arabia	642	Saudi Arabian Society	High Education Level Mature age Student work	Low and / moderate education level Age other than maturity Jobs other than students	Acceptance of COVID-19 vaccination
Kusuma et al (2022)	India	1539	Delhi Society	High Education Level Mature age High income	Low and / moderate education level Age other than maturity Low and / medium income	Acceptance of COVID-19 vaccination
Benny et al (2021)	Indonesia	779	Balinese people	High Education Level Mature age High income	Low and / moderate education level Age other than maturity Low and / medium income	Acceptance of COVID-19 vaccination
Kolobov et al (2022)	Israel	503	Israeli society	Mature age	Age other than maturity	Acceptance of COVID-19 vaccination
Latifa et al (2022)	UAE	2510	Abu Dhabi Society	High Education Level	Low and / moderate education level	Acceptance of COVID-19 vaccination
Kitro et al, (2021)	Thailand	959	Thai society	Mature age Student work	Age other than maturity Jobs other than students	Acceptance of COVID-19 vaccination

Authors (Year)	Country	Sample	Population	Intervention	Comparison	Outcomes
Muhammad (2021)	Bangladesh	605	Bangladeshi society	High Education Level	Low and / moderate education level	Acceptance of COVID-19 vaccination
				Mature age	Age other than maturity	
				Student work	Jobs other than students	
				High income	Low and / medium income	
Hope (2020)	Indonesia	1268	Indonesian society	High Education Level	Low and/moderate education level	Acceptance of COVID-19 vaccination
				Mature age	Age other than maturity	
				Student work	Jobs other than students	

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Education of Health Cadres for Stunting Prevention in The Tegalrejo Village, Gunungkidul, Yogyakarta

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Keywords: Education, Health Cadres, Prevention, Stunting.

Abstract: Stunting is a national problem that targets toddlers, young women, pregnant women, and pregnant women who experience chronic energy shortages in Indonesia. Health cadres are critical individuals in stunting prevention and must be trained to increase stunting prevention knowledge. This community service aimed to increase the understanding of health cadres about stunting and its prevention. The method was used training and education about stunting and prevention efforts for young women, pregnant women, and expectant mothers. Health cadres from Posyandu Kamboja and Posyandu Bougenvile from Tegalrejo Village became training participants, comprising 20 people. The activity was conducted on 4-10 August 2023 in the Tegalrejo Village, Posyandu Kamboja, and Posyandu Bougenvile. The community service was conducted in Tegalrejo Village due to the epicenter of stunting in Gunungkidul. The results showed that there was an increase in knowledge after community service. This increase could be seen from the average knowledge before 8.35, and after 9.50. The statistical test results showed a p-value of 0.000 which was less than 0.05 which means that there was a significant difference in the average knowledge before and after the training of health cadres The intervention improved the knowledge of Health Cadres in Tegalrejo Village.

1 INTRODUCTION

Stunting is a public health problem experienced by children globally and has various causes. Stunting is a condition where a child has a shorter-than-average height. Stunting can have long-term impacts on children's health and development (Anggraini & Rachmawati, 2021).

Stunting affected at least 30% of children in 28 countries in 2000, and more than one in five children under five will be stunted. Between 2000 and 2022, the global prevalence of stunting will decrease from 30% to 22.3% , and the number of suffering children fell from 204.2 million to 148.1 million (UNICEF, 2023a). Meanwhile, the prevalence of stunting in Indonesia will decrease from 24.4% to 21.6% in 2021 to 2022 and the prevalence of stunting will decrease in D.I Yogyakarta, namely 17.3% and 16.4% in 2021 and 2022 (Kemenkes, 2023). However, the prevalence of stunting has not met the goal of reducing this prevalence where the target for reducing stunting is 14% (Rokom Kemenkes, 2023).

Stunting is influenced by various factors: gender, mother's education level, history of vaccination and bottle feeding (Fatima et al., 2020). In addition, maternal factors also affect stunting, such as birth spacing, nutritional status, weight gain during pregnancy, and infectious diseases during pregnancy. Child factors also influence the occurrence of stunting, namely related to birth weight, length of pregnancy, exclusive breastfeeding, dosage of formula milk consumption, and severe infectious diseases (Suryati et al., 2020). Stunting can also be affected by a poor household environment, including a lack of access to clean water and sanitation facilities. These environmental conditions can increase the risk of infection and contribute to stunting (Nshimyiryo et al., 2019).

Stunting can cause delays in the development of children's gross motor skills (Setianingsih et al., 2020). In addition, stunting has an impact on cognitive abilities. The impact of stunting on early childhood cognitive development has also been studied, and it was found that stunting in early childhood is associated with poor psychological functioning in late adolescence (Ekholuenetale et al., 2020).

Based on this situation, the role of health cadres is very important in preventing stunting. Health cadres are members of the local community who are trained in the provision of basic health services and can become effective agents of change in changing community behavior patterns related to nutrition and childcare (Ekholuenetale et al., 2020). Empowering cadres with knowledge and skills on infant and young child feeding can help prevent stunting (Sudarsiwi et al., 2022).

Health cadres need to be educated about the importance of child nutrition, including the recommended nutritional intake for children under 2 years of age. Health cadres must be equipped with effective educational materials on platforms for recording nutritional data and nutritional status to help them educate parents about managing children's nutrition (Sudarsiwi et al., 2022).

With empowerment and training, health cadres can improve skills to prevent stunting in their respective environments. So that health cadres become more effective health promotion agents in society (Mangundap et al., 2022). By strengthening the knowledge and skills of health cadres through education that focuses on preventing stunting, it is hoped that health cadres can act as partners in reducing stunting. This education can also create a domino effect, where improved knowledge and behavior at the community level will contribute to a reduction in the overall prevalence of stunting. Therefore, the purpose of this community service is to educate health cadres in preventing stunting in Tegalrejo Village, Gunungkidul, Yogyakarta.

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2 SUBJECTS AND METHODS

The method used is training and counseling on stunting and prevention efforts for young women, pregnant women, and prospective pregnant women. Health cadres from Posyandu Cambodia and Posyandu Bougenvile from Tegalrejo Village became training participants, with a total of 20 people. The activity was carried out on 4-10 August 2023 in the Tegalrejo Village, Posyandu Cambodia and Posyandu Bougenvile. Data was collected before and after the training was carried out. The data is processed using the Paired Sample T Test, which aimed to test the effectiveness of a treatment against a desired variable quantity (Norfai et al., 2022), that is desired in this study, namely knowledge related to stunting.

3 RESULTS

The implementation of community service went smoothly and the health cadres were enthusiastic in participating in training related to stunting. The following are photos of the activities that have been carried out:

Figure 1. Implementation of Counseling and Training of Health Cadres

Figure 2. Implementation of Counseling and Training of Health Cadres

Based on the results of providing education to health cadres from Posyandu Cambodia and Posyandu Bougenvile from Tegalrejo Village, the results are as follows:

Table 1. Average Cadre Knowledge Pretest and Posttest Scores.

Activity	Average	Difference	p-Value
Pretest	8.35	1.150	0.000
Posttest	9.50		

From Table 1. It is known that there is an average difference before and after the intervention with a p-value of 0.000 <α (0.05), with a difference in average value of 1.150. At the pretest, it got a score of 8.35 and at the posttest, it got a score of 9.50.

4 DISCUSSION

There is a difference in the average before and after the intervention for health cadres at Posyandu Cambodia and Posyandu Bougenvile from Tegalrejo Village regarding stunting. Stunting is the delay in the process of growth and development in children under the age of five due to chronic malnutrition so that children are too short for their age (Sopiatun & Maryati, 2021).

Handling of stunting can be done with Micronutrient supplementation. This treatment is because deficiencies of micronutrients such as zinc, iron, calcium, and vitamin A often occur in children who are stunted. Supplementing this micronutrient has been shown to increase intrauterine femoral length and prevent stunting (Penny, 2012). Improving basic services such as access to clean drinking water, sanitation facilities, and proper waste disposal can contribute to reducing stunting (UNICEF, 2023b). Regularly monitoring children's growth and development and providing appropriate interventions, such as nutritional support, can help prevent and overcome stunting (Hossain et al., 2017).

Providing education and counseling on proper nutritional practices can help parents and caregivers make the right choices regarding their children's diets and prevent stunting (Hossain et al., 2017). In addition, prevention efforts to prevent stunting include involving cadres in the first 1,000 days of life program who are at the forefront of posyandu services after village midwives, so that the role of good cadres is needed in preventing stunting more effectively (Sopiatun & Maryati, 2021). Health cadres need to have correct knowledge about stunting and its prevention so they can educate and guide the community effectively (Mediani et al., 2022). Health cadres can reduce stunting through home visits (Siswati et al., 2022).

This result is supported by a study conducted in Magelang, Indonesia, which focused on delivering

stunting education to posyandu cadres (public health cadres) and mothers of toddlers. This program aims to increase knowledge and skills related to stunting prevention. This study found that this program had a positive impact, where posyandu cadres gained knowledge and skills as stunting extension workers (Fidian et al., 2022).

Another study shows that education for health cadres through pocket books is effective in increasing their knowledge, attitudes and skills in helping families (Mangundap et al., 2022). Based on the community service program to educate posyandu cadres about stunting in Ngara-arap Village, Ngaringan District, Grobogan Regency, Indonesia regarding the first 1000 days of life in preventing stunting. The program resulted in an increase in the knowledge of cadres and an increase in the number of cadres who were able to practice how to measure the length and height of toddlers (Astikasari, 2023).

Health cadres need to be trained to detect malnutrition in children from an early age, because early detection can help prevent stunting (Siswati et al., 2022). Other studies have also concluded that the roles and functions of health cadres need to be improved in the prevention and early detection of stunting by providing continuous coaching, stunting prevention training, and awarding (Mediani et al., 2022).

Health cadres must be equipped with the knowledge and skills to conduct health education to the community. This includes spreading information about stunting prevention, promoting healthy practices, and addressing misconceptions or myths related to stunting (Anisah et al., 2020). Health cadres also need to understand the importance of proper nutrition in preventing stunting. Health cadres should be trained on the types of food that promote healthy growth and development in children, as well as the importance of breastfeeding and complementary foods. (Elly et al., 2023). In addition, health cadres should be encouraged to collaborate with other stakeholders to create a comprehensive and coordinated approach to stunting prevention such as health professionals, local government and community members (Simbolon et al., 2022).

Education of health cadres can help early detection and prevention of stunting which can have a long term impact on the quality of human resources and the productivity of stunted children when they grow up (Mediani et al., 2022). The study found that the training of health cadres was effective in increasing their knowledge, attitudes and skills regarding early detection of stunting and risk factors for stunting prevention (Mangundap et al., 2022). Improving the role and function of health cadres in stunting prevention is very important to achieve effective results (Mediani et al., 2022).

In increasing the knowledge of health cadres about stunting, audiovisual media can be used. This method involves using videos, presentations, and other visual aids to convey educational content (Simbolon et al., 2022). Another effective method that can be used is the use of lecture and discussion sessions. This approach allows cadres to be actively involved in the learning process, ask questions, and exchange ideas with their colleagues (Simbolon et al., 2022).

In addition to providing education, it is also important to conduct training. Providing a comprehensive training program for health cadres is essential to equip them with the necessary knowledge and skills to prevent stunting. These training sessions may cover topics such as causes of stunting, nutrition interventions, health education techniques, and monitoring and evaluation methods (Elly et al., 2023). In addition, to increase the active participation of health cadres, coaching and providing continuous rewards can be carried out (Mediani et al., 2022).

5 CONCLUSIONS

The intervention provided an improvement in the knowledge of Health Cadres in Tegalrejo Village.

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OVERVIEW OF THE NUTRITIONAL STATUS AND ITS AFFECTING FACTORS AMONG CHILDREN UNDER FIVE YEARS IN NUSAWANGI VILLAGE, CISAYONG SUB-DISTRICT, TASIKMALAYA DISTRICT

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Keywords: Stunting, Children Under Five Years, Affecting Factors.

Abstract: Tasikmalaya is one of the cities with a moderate prevalence of stunting. The government issued a decree naming villages and sub-districts as special areas for stunting intervention convergence in 2022, one of which is Cisayong. This study aimed to determine the nutritional status and its affecting factors among children under five years in Nusawangi Village, Cisayong Sub-District, Tasikmalaya District. This was a descriptive study involving 50 children under five years aged 0 to 59 months. The nutritional status was measured by a height-for-age indicator. Macro and micronutrient intake were assessed using SQ-FFQ. Affecting factors such as socio-demographics, history of infectious disease, and nutrition-conscious family were measured using a questionnaire. The prevalence of stunting was 42%. Fathers and mothers have graduated from junior high school, at 40% and 42%, respectively. All working fathers, whereas the mother's work is in housewifery (98%). As many as 60% of children under five years had a deficit in energy intake, 52% in fat, and 72% in carbohydrates. The intake of micronutrients Fe, Zn, and Ca was 54%, 22%, and 96%. Infectious diseases have been identified in 92%. The nutrition-conscious family was 96% unaware of nutrition. It is necessary to make the right nutrition planning program for interventions with children under five years at risk of stunting.

1 INTRODUCTION

Child stunting reduction is the first of six goals in the Global Nutrition Targets for 2025 and a key indicator in the second Sustainable Development Goal of Zero Hunger (Beal et al., 2018). According to research literature, male sex, premature birth, short birth length, non-exclusive breastfeeding for the first six months, short maternal height, low maternal education, low household socio-economic status, living in a household with unimproved latrines and untreated drinking water, limited access to healthcare, and living in rural areas are all risk factors for child stunting in Indonesia. Stunting rates are higher in provinces with limited access to food, which is associated with food insecurity. Another recent study examined the associations between child stunting in Indonesia and indicators of the three underlying causes of malnutrition in UNICEF's conceptual framework: inadequate access to food, care for women and children, health services, and a healthy environment (UNICEF, 2018).

Stunting is one of the priorities of nutritional issues in Indonesia. It is one of the chronic malnutrition effects in children, which will have a long-term impact on the growth and cross-generation of mothers through the cycle of stunting syndrome (Julianti & Elni, 2020). The prevalence of child stunting in Indonesia has remained high, at approximately 21.6% based on Nutrition Status Survey Results Indonesia in 2022. About a quarter of children under five years in West Java Province have height concerns that are below the standard for their age (Kementerian Kesehatan Republik Indonesia, 2023). Tasikmalaya District is one of the cities with a moderate prevalence of stunting. The government issued a decree naming 15 sub-districts as special areas for stunting intervention convergence for Tasikmalaya District in 2022, one of which is Cisayong (SK Bupati Tasikmalaya Tentang

Penetapan Desa Lokasi Khusus Konvergensi Intervensi Stunting Kabupaten, 2022).

Due to many factors which cause stunting, and the high prevalence, the researchers are interested in finding out the nutritional status and its affecting factors among children under five years.

2 SUBJECTS AND METHODS

This was a descriptive study. Data collection was carried out in October 2022 at Nusawangi Village, Cisayong Sub-District, Tasikmalaya District. The study involved 50 mothers and their children under five years. With an 87% precision level, Slovin's method was used for calculating the minimal sample size required to predict the results for the total population (n=328). The purposive sampling technique was used in this research. The respondents were purposively selected based on eligibility criteria as follows: (1) Mothers and their children under five years who are registered and settled in Nusawangi Village, (2) Mothers of children under five years who are willing to be respondents, healthy, and able to communicate well.

The data obtained from the questionnaires were encoded, processed, and categorized using Microsoft Excel. Descriptive statistics or univariate analysis was used to describe the frequency distribution of each data variable.

Measures

The nutritional status was measured by a height-for-age indicator, which is classified into four categories: severely stunted, stunted, normal, and tall. This category is based on the results of calculating the z-score for HAZ *(<-3SD categorized as severely stunted, -3SD until <- 2SD categorized as stunted, -2SD until +3SD categorized as normal, and more than+3SD categorized as tall*), using WHO Anthro software.

Macro and micronutrient intake were assessed using a Semi-Quantitative Food Frequency Questionnaire (SQ-FFQ). Affecting factors such as socio-demographics, history of infectious disease, and nutrition-conscious family indicators were measured using a structured questionnaire. A history of infectious diseases was a history of children under five suffering from infectious diseases in the past one months. Nutrition-conscious family was described information a family called Kadarzi (Family Nutrition Awareness) if they do five indicators other; routinely weighing, exclusive breastfeeding, consuming a variety of foods, using iodized salt, consuming nutritional supplements as recommended through a questionnaire filled out by the mother children under five years.

3 RESULT

Table 1 provides data on the socio-economic characteristics of children under five years and their parents. The higher proportion of the children under five years was male (56%). Also, majority of the children under five years in both male and female were age 25-59 months (56%). The Fathers and mothers have graduated from junior high school, at 40% and 42%, respectively. All working fathers, whereas the mother's work is in housewifery (98%). 62% of children under five years families already have health insurance, and 54% have active insurance status. The majority of family income is below the city's minimum wage (70%).

Table 1: The characteristics of socio-demographic among respondents (n=50).

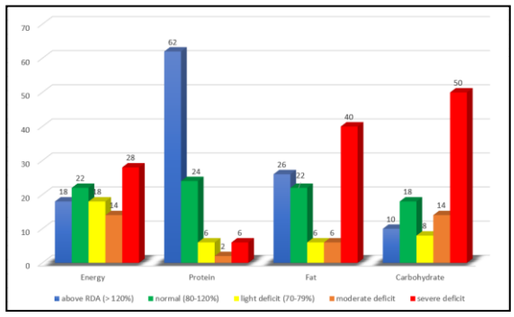
Variable	n	%
Sex		
Male	28	56
Female	22	44
Age		
0-6 months	6	12
7-12 months	3	6
13-24 months	13	26
25-59 months	28	56
Father’s Education		
Does not school	0	0
Elementary school	16	32
Junior High school	20	40
Senior High school	13	26
University	1	2
Mother’s Education		
Does not school	1	2
Elementary school	17	34
Junior High school	21	42
Senior High school	11	22
University	0	0
Father’s occupation		
Not working	0	0
Working	50	100
Mother’s occupation		
Not working (or housewife)	49	98
Working	1	2
Health insurance participation		
Yes	31	62
No	19	38

Health insurance active status		
Yes	27	54
No	23	46
Family Income		
Low	35	70
Above	15	30

Table 2: Frequency distribution children under five years nutritional status in Nusawangi Village 2022 (n=50).

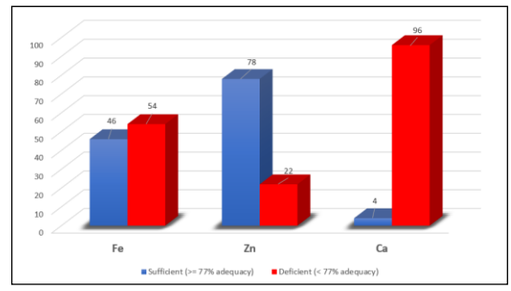
Nutritional Status	N	%
Severely Stunted	10	20
Stunted	11	22
Normal	27	54
Tall	2	4

Data collection revealed that the nutritional status of children under five years with Height-for-Age index a in Nusawangi Village included as many as 10 (20%) children under five years in the severely stunted category. Children under five years in the stunted category include as many as 11 (22%) children under five years. So overall, the percentage of stunting is 42%.



Picture 1: Energy and macronutrient intake among children under five years in Nusawangi Village 2022 (n=50).

As many as 60% of children under five years had light, moderate and severe deficit in energy intake, 52% in fat, and 72% in carbohydrates. but for protein, mostly above the recommended dietary allowance (62%).



Picture 2: Micronutrient intake (Fe, Zn, and Ca) among children under five years in Nusawangi Village 2022 (n=50).

The micronutrient intake among children under five years was mostly deficient in iron (Fe) and calcium (Ca), with less than 77% adequacy of the RDA (54% and 96%, respectively). but sufficient zinc intake among respondents was higher than deficient.

Table 3: Frequency distribution children under five years history of infectious disease and the nutrition-conscious family (Kadarzi) in Nusawangi Village 2022 (n=50).

Variable	n	%
Infectious Disease		
Yes	46	92
No	4	8
Nutrition-conscious		
Aware	2	4
Not aware	48	96

Infectious diseases among children under five years and those unaware of nutrition-conscious families were big in numbers, 92% and 96% respectively.

Table 4: Frequency distribution children under five years of the 5 nutrition-conscious family indicators (Kadarzi) in Nusawangi Village 2022 (n=50).

Variable	Yes n (%)	No n (%)
Routenely weighing	17 (34)	22 (66)
Exclusive breastfeeding	36 (72)	14 (28)
Consuming a variety of foods	27 (54)	23 (46)
Using Iodized salt	50 (100)	0 (0)
Consuming nutritional supplements as recommended	10 (20)	40 (80)

Based on Table 4, the results of research on the five indicators of a nutrition-conscious family (Kadarzi) found that not routinely weighing and not consuming nutritional supplements were still high in

number rather than yes. Otherwise, the exclusive breastfeeding, consuming a variety of foods and using iodized salt has mostly been fulfilled.

4 DISCUSSION

Stunting is defined as a restriction of a child's potential growth with a height-for-age z-score of more than 2 standard deviations below the World Health Organization (WHO) Child Growth Standards median. Stunting can occur in children. Many factors, including family income, dietary habits, infections, maternal nutrition status, infectious diseases, micronutrient deficiencies, and the environment, have an impact on the first 1000 days following conception (World Health Organization, 2018). In this study the prevalence of stunting was a heavy categories problem.

A good nutritional status can be a foundation of child health that can optimize growth and development of young children and reduce morbidity, disability, and death. it also will improve the quality of human resources (Kadir, 2019).

Inadequate nutrition during the first two years of life may lead to childhood morbidity and mortality, as well as inadequate brain development. Infants are at increased risk of malnutrition by six months, when breast milk alone is no longer sufficient to meet their nutritional requirements (Fekadu et al., 2015).

Micronutrient deficiencies and stunting are known as a significant problem in most developing countries, including Indonesia. Severely stunted children had a significantly lower mean of Hb concentration compared to stunted and normal height children (Ernawati et al., 2021).

Even though the fathers of children under five years in this study all work but their income is still low. The majority of family income in Nusawangi Village is below the Tasikmalaya district minimum wage (Rp.2.326.772,-). Improving like income was required for continuous improvement in a specific strategy that involves many factors. In literature review socio-economic status was reported as one of consistent factors associated with stunting in Indonesia and others countries in Southeast Asia like Cambodia, Myanmar, Laos, Thailand, and Malaysia (Rosiyati et al., 2018).

The study implied that preventing stunting requires multi-disciplinary approach, the study suggests that public health intervention programmer should focus on these risk factors to reduce or alleviate stunting. Programs or advocacies promoting proper nutrition, breastfeeding, multiple micronutrient supplementation, immunization, periodic growth monitoring, as well as knowledge of mothers on their child's nutritional status should be strengthened to address the risk factors of stunting (Piniliw et al., 2021).

The research showed that children under five who had a history of infectious diseases had log odd to experience a stunting risk of 2.23 units compared to who had no history of infectious disease. Recurrent infectious diseases suffered by a child will cause impaired absorption of nutrients and subclinical infections that result in nutrient intakes that should be absorbed by the body to be not optimal resulting in chronic malnutrition, one of which is shown to be stunting (Sugiyanto et al., 2019).

Based on research *The Correlation Of The Application Of Nutritional Conscious Family (Kadarzi) Towards Children under five years Nutrition Status* There was a significant correlation between the Application of Nutrition Conscious Families to the Nutritional Status of Children under five years of TB/U p value = 0.005 and OR value 1.318 (Julianti & Sartika, 2022).

5 CONCLUSIONS

The prevalence of stunting was a heavy problem. Fathers and mothers have graduated mostly from junior high school. All working fathers, whereas the mother's work is in housewifery. Children under five years had a deficit in energy intake in fat and carbohydrates. The micronutrient intake of Fe and Ca was high in deficiency. Infectious diseases among children under five years and those unaware of nutrition-conscious families were big in numbers. Further research is needed regarding the relationship between variables and studying the causal factors that most influence stunting.

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THE EFFECT OF INFANT AND YOUNG CHILD FEEDING (IYCF) EDUCATIONAL VIDEO ON THE KNOWLEDGE OF MOTHERS WITH 6-12 MONTHS OLD CHILDREN IN NGABEAN VILLAGE, KENDAL, CENTRAL JAVA

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Keywords: Educational video, feeding, infants and children, knowledge, mothers.

Abstract: Introduction: Nutrition is the basic food substance for growth and health. Nutrition is a very important factor in realizing excellent Indonesian human beings. Various studies reveal that malnutrition, especially at an early age, will have an impact on children's growth and development. The purpose of this study was to determine the effect of infant and young child feeding (IYCF) educational videos on the knowledge of mothers who have children aged 6-12 months. The sample in this study were mothers who have children aged 6-12 months in Ngabean Village, Kendal Regency, totaling 60 respondents who met the inclusion and exclusion criteria. Methods: This type of research is quantitative research with quasi experiment design. The sampling technique used was purposive sampling. Knowledge data was obtained using a pre-test & post-test questionnaire. Data were analyzed using univariate and bivariate analysis using the Wilcoxon test. Results: The results of the univariate test showed that the data on the characteristics of baduta were not normally distributed p=0.00 (p<0.05), the results of the pre-test and post-test knowledge of baduta mothers were not normally distributed p=0.00 (p<0.05), so it can be concluded that there is a significant relationship to the effectiveness of providing IYCF videos. The bivariate results show that there is a significant relationship to the effectiveness of providing IYCF video can be seen from the statistical test results obtained a value of p=0.000 (<0.05).

1 INTRODUCTION

Nutrition is an important component for the growth and health of the body. For the people of Indonesia nutrition is very important to create a better quality of society. It is known that 24.4% are stunted in Indonesia, according to the findings of the 2021 Indonesian Nutritional Status Study (SSGI) (Kementerian Kesehatan RI, 2021).

According to Nuzula, Oktaviana and Anggari (2017), malnutrition in toddlers hinders their physical and mental development, reduces stamina, shortens their healthy life span, and can even cause disability. It also increases morbidity and mortality rates. Stimulation of Child Development Detection and Intervention (SDIDTK) involves developing basic early childhood skills, such as height, head circumference, and calculating weight, taking vision and hearing tests, and completing mental and emotional tests. Early Autism, Attention Deficit Disorder, and Respiratory Infection Hyperactivity Screening Checklist (ARI) ISPA is a virus-based disease, and symptoms can include pneumonia, nasal congestion, sore throat, fever, dry cough, and cough with phlegm accompanied by signs of shortness of breath (Kementerian Kesehatan RI, 2018).

Specifically, in Central Java, the incidence of wasting toddlers is 6.7%, ranking second on the island of Java (Ministry of Health, 2021). Meanwhile, the nutritional status of toddlers in Indonesia in 2016 was 17.8%, stunting was 17.5%, wasting was 11.1%, and obesity was 4.3%, according to the Nutrition Status Monitor (PSG) for toddler nutritional problems. Malnutrition status was reported 17%, short 29.6%, thin 9.5%, and fat 4.6% in 2017 (Furqan, Faridi, Alibbirwin & Susanti., 2020).

The Indonesian Ministry of Health stated that 1000 HPK was one of the government's initiatives to prevent stunting because currently brain growth is very fast. Inadequate nutrition during this time will

cause irreparable damage or stunted growth later in life (Kementerian Kesehatan RI, 2018).

To overcome stunting, it is necessary to improve nutrition from the time the fetus is in the womb, exclusive breastfeeding until the age of 6 months, and proper complementary food for breastfeeding from the age of 6 months. A good feeding pattern for children is to provide food that meets the nutritional needs of children. Several factors related to the nutritional status of infants include food intake, infection status, mother's knowledge about IYCF, mother's education and pattern of giving IYCF (Furqan, Faridi, Alibbirwin & Susanti., 2020).

Based on the above description, the purpose of counseling related to infant and young child feeding (IYCF) is to measure the extent of mothers' understanding of infant and young child feeding through audiovisual materials for educational purposes. According to previous research, public education initiatives that include lectures and video screenings have yielded good results. (Putri, Zuleika, Murti, & Humayrah., 2022). Because the audience seems interested in the video content and wants to watch it to the end, audio-visual and video media are more interesting and not monotonous (Mulyani & Fitriana., 2020).

2 SUBJECTS AND METHODS

The focus of this research is the effect of PMBA video educational media on the knowledge of mothers who have babies aged 6 to 12 months in Ngabean Kendal Village, Central Java. Data obtained from using the Knowledge Questionnaire. The population of this study were mothers who had children aged 6-12 months in Ngabean village. The sample of this research is 60 respondents who fulfill inclusion & exclusion. The sampling method used is non-probability sampling through a purposive sampling technique with the consideration that the researcher has done so that the sample is based on predetermined inclusion and exclusion criteria.

Data analysis was performed using univariate and bivariate data. Univariate analysis was used to analyze the frequency of the dependent and independent variables. The dependent variable includes the respondent's characteristics of knowledge about IYCF before and after being given the intervention. then the independent variables include education with video media. In addition, bivariate analysis was carried out using the Wilcokson test to determine the effect of providing videos before and after the intervention was carried out on the participants

3 RESULT

Research conducted on mothers who have children aged 6-12 months in Ngabean Village, obtained the results of the frequency distribution based on the characteristics of the respondents presented in the following table:

Table 1: Respondent characteristics.

Age	n	%	Median	Min-Max
6-12 month	60	100	9	6-12
Gender	n		%	
Male	38		63,3	
Female	22		36,7	
Total	60		100	
Region	n		%	
Hamlet Krajan	6		10	
Hamlet Dukuh	3		5	
Hamlet Gowo	3		5	
Hamlet Mluro	14		23,3	
Hamlet Ngularan	18		30	
Hamlet Ngabean	16		26,7	
Total	60		100	

Based on table 1, the distribution of data on the characteristics of children under two years old was not normally distributed ($p < 0.05$) so that based on the median age of the respondents, namely 9 months, the youngest was 6 months old and the oldest was 12 years old. The proportion of respondents with male sex is greater when compared to women, which is equal to 63.3%. The highest proportion of respondents was in the Ngularan hamlet at 30%.

The results of the pre-test and post-test of knowledge on mothers under two years old, using the Kolmogorov-Smirnono test because the respondents numbered more than 50 people can be seen in the following table:

Table 2: Result pre-test dan post-test knowledge mother badutas.

Variable	N	%	Median	Min-Max
Pre-test result				
Less	0	0	71,43	61,90 – 90,48
Enough	34	56,7		
Good	26	43,3		
Post-test result				
Less	0	0	95,23	61,90 – 100,00
Enough	4	6,7		
Good	56	93,3		
Total	100	100		

Based on table 2, the distribution of data from the pre-test and post-test results for mothers under two years of age was not normally distributed (p <0.05) so that based on the pre-test median score, it was 71.43 with the lowest score being 61.90 and the highest being 90.48. The midpoint of the post-test was 95.23 with the lowest being 61.90 and the highest being 100.00.

Bivariate analysis leads to the analysis of two variables, which is a form of statistical analysis used to determine the relationship between the two variables to be studied. In the knowledge variable about Feeding Infants and Children (IYCF) before and after being given education in the form of video media to mothers with children aged 6-12 months using the Wilcoxon test, the results are as follows:

Table 3: Bivariate Analysis of IYCF Pre-test and Post-test.

Variable	Mean	Min-Max	p-Value
Pre-test	73,89	61,90-90,48	0,000
Post-test	90,71	61,90-100,00	

Based on the table above shows that the statistical test results obtained a value of p = 0.000 (<0.05), then based on the pre-test center value of 73,89 with the lowest value of 61,90 and the highest of 90,48. The post-test center value is 95.23 with the lowest value of 61,90 and the highest of 100.00. It can be concluded that there is a significant relationship on the effectiveness of providing IYCF videos.

4 DISCUSSION

Even though mothers of toddlers have only seen how to feed their children through YouTube or other media, they have never received complete information about Infant and Young Children Feeding (IYCF). Other factors that may have influenced the pre-test and post-test results include the fact that some hamlets have limited internet access and the community is not aware of the importance of infant feeding practices. Health workers educate the public about exclusive breastfeeding and complementary feeding, but there is a lack of outreach to the community about Infant and Young Children Feeding (IYCF). This research is in line with the research of Setiawati, Puspita, Gambir & Rafiony (2022) which also shows differences in knowledge about IYCF before and after intervention with video media, with an average value before and after 17.50 17.50 and p = 0.000 (p<0.05). The findings of this study imply that mothers' nutrition awareness is influenced by video-based nutrition counseling.

The findings of this study are also in line with Fitriah, Kalsum & Rahman (2023) they show a p-value of 0.000 (p <0.05), that education using video media has an impact on knowledge about febrile seizures in the less knowledge category, and great knowledge increases with intervention Partial. Before and after the intervention, the mean knowledge scores were 9.25 and 13.4, respectively.

Considering that some statistical test results obtained a value of p = 0.000 (p <0.05) when compared before and after the intervention was carried out in mothers with children under the age of two, it can be concluded that there is a significant relationship to the effectiveness of the provision of PMBA video media . This happened because the mother who has children under two years old watched the IYCF video twice for the information contained in it. This study supports Agustiningsih statement (2015) that video functions as an alternative learning medium to support the successful implementation of the 2013 National Standards. The results of the relative effectiveness test on data analysis obtained ER = 48.14%, according to the elementary school curriculum. These findings show that using videos outperforms not using videos by around 48.14 percent. When studying certain subjects, the value and effectiveness of using video can be used as a substitute option.

This study is also in line with the findings from Munawaroh, Putri & Kristiningrum (2022), which shows that there is a significant effect of online breastfeeding class preparation using video media on breastfeeding self-efficacy. The results of the paired sample t-test showed a p-value of 0.05, or there was a difference in the pretest and posttest BSE scores.

Conclusion: One of the online training platforms used as an increase in breastfeeding self-efficacy is educational video media. Delivering education online has become increasingly prevalent in light of recent innovations.

This study contradicts Sabarudin, Mahmudah, Aba, Nggawu, Nirmala et al., (2020), who claim that film delivery is ineffective and leaflets are used more often. This is because when using two media simultaneously (video and leaflet), respondents are exposed to the material twice, whereas when using only video, they are only exposed once. The better the mother's behavior in providing supplementary food to children aged 6 to 24 months, the more information they learn and knowledge about it. The behavior and attitude of the mother in determining what will be additional consumption for her baby depends on the level of awareness of the mother regarding what consumption is given for complementary foods. Researchers hope that each mother has knowledge related to nutrition that can influence her child's eating choices. It can also help strengthen a diet situation. Mother's nutritional education is very influential in influencing children's eating patterns. Mother's behavior in providing additional food to her baby can be improved by counselling (Kustiani & Misa.,2018)

5 CONCLUSIONS

Based on the results, the highest response was 9 months old, the male sex was larger than the female and the highest proportion of respondents was in Ngularan Hamlet. Based on the results of the Kolmogorov-Smirnov test, it said that the pre-test and post-test results of knowledge of mothers under two years old were not normally distributed p = 0.000 (p <0.05). Based on the results of the effect of giving videos before and after the intervention was carried out on mothers under two years old using the Wilcoxon test, it showed that there was a significant relationship to the effectiveness of giving PMBA videos, which could be seen from the statistical test results, the value of p = 0.000 (<0.05).

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FACTORS ASSOCIATED WITH RESPIRATORY COMPLAINTS OF PRODUCTION DEPARTMENT WORKERS PT. X CITEUREUP BOGOR IN 2023

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Keywords: Respiratory complaints, dust content, workers.

Abstract: Respiratory complaints, namely one or several complaints in the form of discomfort that is felt due to a disturbance in the respiratory tract without any physical examination, observation or other forms of measurement carried out by medical personnel. These complaints include shortness of breath, coughing, wheezing, and chest pain. This study aimed to determine the factors associated with respiratory complaints of production workers at PT. X Citeureup. This research method is quantitative with cross sectional design. The total population in this study was 80 workers with a sample obtained from the Lemeshow formula, namely 70 respondents. Data collection using a questionnaire and Portable High Volume Air Sampler. Data analysis techniques in this study were univariate analysis and bivariate analysis. The results showed that 67.1% of respondents experienced respiratory complaints 77.8% with a vulnerable age, 80% with a long working period, 67.2% with the habit of wearing a mask while working, 72% with a long exposure of ≤8 hours/day and 78.6% with smoking habits. The measurement result for the highest dust content in the packing unit was 4.72 mg/m3. In addition, there is a relationship between age (Pvalue=0.023), years of working (Pvalue=0.017), and smoking habits (Pvalue=0.026) with respiratory complaints. There is no relationship between the use of masks (Pvalue=1.000) and length of exposure (Pvalue=0.277). Suggestions in this study are that companies can put more emphasis on their workers to carry out medical checkups so that workers' personal health is evaluated and can apply regulations not smoking / reducing smoking consumption in workers.

1 INTRODUCTION

As time goes on, industrial activities in the world are growing more rapidly. This development provides convenience in processes in the work industry with the existence of various kinds of modern and complex technologies whose operation requires certain skills so as not to cause losses due to these technologies, such as the increasing risk of accidents and occupational diseases or PAK. Workplace or industrial hazards are situations or elements that have the potential to cause accidents at work as well as work-related illnesses or health problems (Mahawati et al., 2021).

According to Suma'mur (2013), potential work hazards that can affect health worker can be classified based on work environmental factors. These potential hazards include potential hazards based on physical factors (lighting, noise, vibration, etc.), chemical factors (concentration of steam, gas, dust), biological factors (viruses, bacteria, worms), ergonomic factors (work equipment design, machine work), and psychological factors (poor leadership and communication). From the existence of these potential hazards, problems that can occur are complaints to health problems in the workforce resulting from potential hazards in the industrial work environment, one of which is dust that arises on work at production sites (Fujianti et al., 2015).

Respiratory complaints, namely one or several complaints in the form of discomfort felt by a person caused by disruption of the respiratory tract starting from the nose to the alveoli without examining and testing physically, observing or other types of assessment carried out by medical personnel. This complaint is characterized by the presence of several complaints felt by the sufferer due to disturbances in the respiratory tract, such as the nose to the alveoli. Respiratory complaints can be in the form of shortness of breath, coughing, wheezing, and chest pain which are the body's reaction to the presence of foreign substances that will cause these complaints (Octavia, 2019).

The International Labor Organization (ILO) stated that in 2012 as many as 34% of cancers, 25% of accidents, 21% of respiratory diseases, 15% of cardiovascular diseases, and 5% of other factors were the cause of death due to work, including (Susanti, 2021). According to the WHO report, the level of air pollution in big cities is > 70% and this number is increasing, even reaching 15% annually. While 30% comes from household activities, burning waste, the effects of air pollution in high-rise buildings, and industrial operations (Octavia, 2019). Based on the 2006 Susenas data, the main complaints of respiratory disorders in Indonesia include coughing of 49.92%. One of the causes of respiratory complaints is the result of exposure to dust in industrial activities. Of the many complaints of respiratory disorders in Indonesia, the absence of health complaints on the body is a healthy blessing, as the words of the Prophet in HR. al-Bukhari from Ibn Abbas which means "many people lose because of two favors; health and leisure"

According to Putri (2018), the cement industry is one of the industries that is growing rapidly in Indonesia with a total production capacity that is spread and distributed in almost all regions of the archipelago, reaching 27 tons per year. In the production process, starting from preparing raw materials, preparing raw materials, preparing clinker, grinding cement to packing and removing cement, it produces dust which can cause respiratory complaints to existing workers. This dust can make workers experience coughing, shortness of breath, stuffy nose, and sore throat which affects the performance of these workers.

Respiratory complaints are the focus of this study because these complaints result from exposure to materials that arise during the production process, such as high levels of dust in the industry. As explained by (Hasyim et al., 2015) that "dust is a particulate material that can cause complaints to respiratory disorders in workers when it enters the human respiratory organs,". The consequences of exposure to dust are very dangerous, including allergic or atopic responses and long-term exposure that causes Chronic Obstructive Pulmonary Disease (COPD), or can also be referred to as a response to changes in the immune system in the lung tissue and changes permanently/forever. These three responses cause a disease called allergic alveolitis or hypersensitivity pneumonitis (Putri, 2018).

According to research conducted by Sofia Ananda Putri in 2018 regarding factors related to respiratory complaints in non-organic packing plant workers Indarung packaging bureau I PT. Semen Padang, that workers who have respiratory complaints are dominant in respondents with work experience >5 years compared to respondents with work experience <5 years, in other words working period has a relationship with respiratory complaints in workers. This is because the longer the individual works, the more risks are taken from hazards in the work environment. In addition, in a study conducted by Fauziah et al., (2020) stated that there was a significant relationship between smoking habits and respiratory complaints in workers in the Jambi Coal

Stockpile area. A person with a smoking habit is more at risk of experiencing respiratory complaints due to changes in lung function and various clinical abnormalities due to changes in the structure of the airways. Safitri (2016) said that age has a relationship with respiratory complaints in intake and bulk warehouse workers. The high amount of dust inhaled and buried in the lungs will impact daily inhalation causing a higher risk of someone aged >40 years experiencing respiratory complaints.

The use of masks is also associated with respiratory complaints. This is in accordance with the research of Widiasari et al., (2020) where it can be seen that the use of masks is associated with respiratory complaints in furniture home industry workers. This is because the function of wearing a mask is to prevent dust from entering the respiratory tract, so by not using a mask the possibility of subjective complaints is higher. Octavia's research (2019) regarding factors related to respiratory complaints in parking attendants in the city of Prambulih, South Sumatra, shows that exposure time is also related to respiratory complaints. The maximum length of exposure according to Law no. 14 in 2003 is for 8 hours/day. If the duration of time a person works is longer in his work environment, the more dust he is exposed to, it increases the chance of decreasing lung function. In addition, in the 2018 measurement from research conducted by Tristriani (2018) workers who experience respiratory complaints due to dust at PT. X, namely as many as 77 people (72%) and who did not experience complaints as many as 30 people (28%). Dust measurement in one part of the agency reached 10.43 mg/m³ which has exceeded the threshold value according to PERMENAKER No. 5 of 2018 which is 10 mg/m³. The study said that there was a significant relationship between dust levels and respiratory complaints in workers. High dust levels if inhaled into the respiratory organs can cause complaints to respiratory disorders in workers (Hasyim et al., 2015).

PT. X is one of the largest cement producers in Indonesia. In accordance with the deed of establishment, this company has business involvement in general mining, general trading, land and sea transportation as well as procurement of electricity facilities and infrastructure. This company has an annual cement production capacity of 25.5 million tons (X, 2021). Besides that PT. X on the other hand also has a branch company that makes ready-mix concrete, and manages aggregates and mines waste.

Based on the preliminary studies that have been conducted at PT. X, there are 6 out of 10 workers who complain of respiratory complaints such as coughing and shortness of breath. It was also found that a lot of dust was emitted from the cement manufacturing process and there were still 8 out of 10 workers who did not wear masks during the preliminary study. Therefore, the explanation that has been described above is the background for the author to examine the factors related to respiratory complaints in workers in the production department of PT. X Unit Citeureup, Bogor.

2 METHOD

This study using the cross sectional design with a quantitative research method. This research was conducted at PT. X Citeureup Bogor in the production department. The research was carried out in November-June 2023. The population of this study were all workers in the production department of PT. X In 2023 with as many as 80 respondents and the sample was obtained using the Lemeshow formula so that a sample of 70 respondents was obtained. The primary data from this study came from interviewing workers regarding respiratory complaints, dust levels by direct measurement using a Portable High Volume Air Sampler, age, years of service, use of masks, length of exposure, and smoking habits. Then secondary data in the form of data about the general description or company profile of PT. X Citeureup.

3 RESULTS

3.1 Respiratory Complaints

Based on the findings from the questionnaire, the following is the distribution of workers who experience respiratory complaints:

Table 1: Distribution of Respondents Based on Respiratory Complaints PT. X Citeureup in 2023.

No	Respiratory Complaints	Respondenent's Answer			
		Yes		No	
		n	%	n	%
Shortness of Breath					
1.	Shortness of breath?	16	22,9	54	77,1
2.	Shortness of breath while	31	44,3	39	55,7

No	Respiratory Complaints	Respondenent's Answer			
		Yes		No	
		n	%	n	%
	walking fast on level ground or walking up a slight hill/inclince?				
3.	Shortness of breath when walking with other people at an ordinary pace on level ground	5	7,1	65	92,9
4.	Have to stop for breath when walking with other people at your own pace on level ground?	7	10	63	90
5.	Shortness of breath that inferes with your job?	10	14,3	60	85,7
Coughing					
6.	Coughing that produces phlegm (thick sputum)?	20	28,6	50	71,4
7.	Coughing that wakes you early in the morning?	7	10	63	90
8.	Coughing that occurs mostly when you are lying down?	6	8,6	64	91,4
9.	Coughing up blood?	-	-	70	100
Wheezing					
10.	Wheezing that inferes with your job?	3	4,3	67	95,7
Chest Pain					
11.	Chest pain when you breath?	3	4,3	67	95,7
12.	Chest pain when you breath deeply?	11	15,7	59	84,3

Table 1 shows the distribution of the frequency of complaints based on each item of worker respiratory complaints, where most respondents answered the option "yes" to complaints of shortness of breath question item number 2 "shortness of breath when walking fast on the ground or climbing a slight incline?" namely as many as 31 respondents or 44.3% and most respondents answered "no" to cough complaints, especially the question item "coughing up blood?" is as many as 70 respondents or 100%.

The respiratory complaints variable was categorized into no complaints and no complaints. Respondents were said to have or had respiratory complaints if the score obtained was ≥ 1 complaint and said there were no complaints if the score obtained was 0. felt by the respondents.

Table 2: Distribution of Respondents Based on Respiratory Complaints PT. X Citeureup in 2023.

No	Respiratory Complaints	Frequency (n)	Precentage (%)
1.	There are complaints	47	67,1
2.	No complaints	23	32,9
Total		70	100

Table 2 shows that 67.1% or 47 respondents had respiratory complaints and 32.9% or 23 respondents did not have respiratory complaints.

3.2 Dust Content

Measurement of dust content in this study was carried out at 4unit points in the production section by looking at the dustiest area at each point. At each point, measurements were taken at 3 different times, namely 08.00 to 09.00, 11.00 to 12.00, and 14.00 to 15.00. The following table shows the results of the concentration of dust content at the 4 measurement points.

Table 3: Results of Measurement of Dust Content by Measurement Points in the Production Section of PT. X Citeureup in 2023.

No	Section	Average (mg/m^3)	Workers	
			n	%
1.	Raw mill	4.30	20	28,6
2.	Finish mill	2.90	17	24,3
3.	Kiln	2.53	18	25,7
4.	Packing	4.72	15	21,4

Table 3 shows that the dust content at the four location points, namely, raw mill is 4.30 mg/m^3, finish mill is 2.90 mg/m^3, kiln is 1.69 mg/m^3, and packing is 4.85 mg/m^3, the location for measuring the dust content at the four points that had the highest dust content was the packing unit, which was 4.7 mg/m^3. Meanwhile, the location with the smallest dust content was in the kiln unit, which was 2.53 $mg/m^{3.}$.

3.3 Age

The age grouping of respondents in this study was divided into 2 groups, namely the vulnerable group with age ≥40 years and the non-vulnerable group with age <40 years.

Table 4: Distribution of Respondents by Age in the Production Section of PT. X Citeureup in 2023.

No	Age	Frequency (n)	Precentage (%)
1.	Vulnerable	45	64,3
2.	Not Vulnerable	25	35,7
Total		70	70

Table 4 shows that 45 respondents or 64.3% are susceptible to respiratory complaints and 25 respondents or 35.7% are not susceptible to respiratory complaints.

3.4 Years of Working

The grouping of respondent's working years in this study was grouped into old working years, namely > 5 years and new working periods, namely ≤ 5 years.

Table 5: Frequency Distribution of Respondents' Tenure in the Production Section of PT. X Citeureup Year 2023.

No	Years of Working	Frequency (n)	Precentage (%)
1.	Old	40	57,1
2.	New	30	42,9
Total		70	70

Based on the results of table 5, it can be seen that the frequency distribution of workers who work >5 years or long working period is 40 workers (57.1%), while those who work ≤5 years or new working period are as many as 30 workers (42.9%).

3.5 Use of Mask

The variable of using a mask was grouped into not using a mask for respondents who answered "never" and using a mask for respondents who answered "always" and "sometimes". The results of the use of respondents' masks in this study can be seen in the following table:

Table 6: Frequency Distribution of Respondents Use of Masks in the Production Department of PT. X Citeureup in 2023.

No	Use of Mask	Frequency (n)	Precentage (%)
1.	Not Using Mask	3	4,3
2.	Using a Mask	67	95,7
Total		70	70

Based on the results of table 6, it can be seen that the frequency distribution of workers who do not use masks while working is as many as 3 workers (4.3%), while those who use masks while working are as many as 67 workers (95.7%).

3.6 Length of Exposure

The grouping of the length of exposure of the respondents in this study was grouped into duration of exposure that exceed ecposure duration, namely >8 hours/day and under exposure duration, namely ≤8 hours/day.

Table 7: Frequency Distribution of Respondents Length of Exposure in the Production Section of PT. X Citeureup in 2023

No	Length of Exposure	Frequency (n)	Precentage (%)
1.	Exceed Exposure Duration	3	4,3
2.	Under Exposure Duration	67	95,7
Total		70	70

Based on the results of table 5.10, it can be seen that the frequency distribution of respondents who had longer exposure duration than exposure duration or >8 hours/day were 20 respondents (28.6%), while respondents who had exposure duration below exposure duration or ≤8 hours/day namely as many as 50 workers (71.4%).

3.7 Smoking Habits

This variable is divided into 2 categories calculated in the last 1 month, namely workers with habits smoking and no smoking

Table 8: Frequency Distribution of Respondents Smoking Habit Categories in the Production Department of PT. X Citeureup in 2023.

No	Smoking Habits	Frequency (n)	Precentage (%)
1.	Smoking	3	4,3
2.	No Smoking	67	95,7
Total		70	70

Based on table 5.12, it can be seen that the frequency distribution of workers who smoke is 42 workers (60%), while those who do not smoke are 28 workers (40%).

4 DISCUSSION

4.1 Respiratory Complaints

Based on the results of research that has been carried out on workers in the production section of PT. X Citeureup in 2023, it was found that out of 70 respondents there were 47 respondents or as many as 67.1% experienced respiratory complaints and 23 respondents or as many as 32.9% did not experience respiratory complaints. There were several complaints that were most experienced by respondents, namely complaints of shortness of breath, especially shortness of breath when walking quickly on the ground or climbing a slight incline of 44.3% and complaints of coughing, especially coughing up phlegm by 28.6%. This is consistent with research conducted by Medyati et al., (2023) on furniture industry workers in the Abepura District, where workers who had respiratory complaints were dominant at 63.9% compared to workers who did not have respiratory complaints, namely 36. 1%. This is because the industry emits industrial dust in its work process.

In this study, respiratory complaints were common in workers aged ≥40 years in the vulnerable category and workers who had smoking habits. As stated by Guyton Hall (2008) who said that the ability of a person's lung function will decrease on average at the age of more than 40 years, thereby increasing the possibility of respiratory complaints. In addition, according to Fujianti et al., (2015) said workers with smoking habits also have a risk that can cause respiratory complaints. Respiratory complaints felt by workers are the result of the body's protective mechanisme to remove foreign particles that attack the respiratory system. The emergence of respiratory complaints is usually a sign of disease in the respiratory/respiratory system. If workers are exposed for a long time, the complaints they feel can become more serious until they can cause collapse or respiratory failure and even death.

The number of workers who experience respiratory complaints is more than workers who do not experience respiratory complaints. This should be brought to the attention of the company even though in general, workers at PT. X has been required to carry out medical check-ups regularly or once a year to minimize the risk of respiratory complaints in workers.

4.2 Dust Content

Based on the results of research conducted in May 2023, dust content was measured at 4 points, namely the raw mill, kiln, finish mill, and packing. The measurement lasts for 1 hour at 3 times, namely 08.00-09.00, 11.00-12.00, 14.00-13.00 at each point.

Based on the measurement results, the four measurement points resulted in no dust content exceeding the threshold value or NAV, namely 10 mg/m3 according to PERMENAKER No. 5 of 2018.

From the existing data it can be concluded that risk control for dust at PT. X is good, because this company has referred to the International Standard Organization 14001. In addition, PT. X himself has implemented engineering control in the form of local ventilation and dust collectors in each factory unit. A dust collector is a vacuum suction machine which is likened to a vacuum to suck up production dust so that the dust produced can be much less than without a dust collector. In addition, there is also an electrostatic precipitator (ESP), which is an electrical device used to separate and precipitate dust from the air. On the other hand, even though the dust level is below the threshold value, it should also be noted that if the dust is still present in the work environment, dust that has been accumulated for a long time and is retained in the respiratory tract can trigger respiratory complaints.

According to Tasidjawa (2022) accumulation of dust in the respiratory tract which can be characterized by obstructive disorders, reduced expiratory ability of the lungs or reduced ability of the lungs to inhale air, as well as respiratory complaints when workers are exposed to dust. This is the result of exposure to dust for a long time. Therefore, another step for PT. X in minimizing the risk of Respiratory Complaints occurring is to oblige its workers to do a medical checkup.

4.3 Relationship between Age with Respiratory Complaints

Based on the results of the study, it was shown that respondents aged ≥40 years were more vulnerable, namely 45 respondents or 64.3% compared to respondents aged <40 years/not vulnerable, namely 25 respondents or 35.7%. This is in line with research conducted by Atmaja and Ardyanto (2017) where workers aged ≥40 years are 79% more than workers aged <40 years.

The results of the bivariate analysis showed that respondents who were vulnerable or aged ≥40 years had more respiratory complaints, namely 35 respondents or 77.8% compared to respondents who were not susceptible or aged <40 years. The results of the chi square test obtained a Pvalue of 0.023 which means a Pvalue of ≤0.05 and showed a significant relationship between age and respiratory complaints among workers in the production department of PT. X Citeureup. The PR obtained was 1.620 where this value indicated that respondents with a vulnerable age were at risk of 1.620 times for having respiratory complaints.

This is in accordance with research conducted by Medyati et al., (2023) which said there was a significant relationship between respiratory complaints and age with a Pvalue of 0.029. Another study conducted by Anggraeni and Camelia (2022) on kempang baking workers said that there was a relationship between age and respiratory complaints with a Pvalue of 0.004. This is also in line with research conducted by Fujianti (2015) that age has a significant relationship with symptoms of respiratory problems for Teak Berkah furniture workers in Jambi City with a Pvalue of 0.016. This research is in line because 50% of workers aged ≥40 years actually work in a part with dust exposure. Fitriyani (2013) said that an older worker has a vital lung capacity that will decrease due to the decline in organ function so that it is more vulnerable to exposure to pollutants that can affect the emergence of respiratory complaints. Some of the studies above show results that are in line with this research, so it can be said that there is consistency between this research and previous research.

Based on data in the field, the average age of workers is more than 40.56 years or included in the vulnerable category (≥40 years) and the oldest age is 55 years where the retirement age for workers is 55 years. The older a person is, the higher the risk of that person experiencing respiratory problems. This is due to the increasing amount of dust that is inhaled and buried in the respiratory tract, especially the lungs as a result of inhaling the dust every day (Amalia and Novianus, 2022).

4.4 Relationship between Years of Working with Respiratory Complaints

Based on the results of this study, it showed that respondents with a long working period or > 5 years were 57% or 40 more respondents compared to respondents who had a new working period or ≤5 years, namely 42.9% or 30 respondents. This is in line with research conducted by Puspasari where the working period of >5 years is more, namely 57.9%.

The results of the bivariate analysis stated that respondents with a long working period or > 5 years had more respiratory complaints, namely 80% or 32 respondents compared to respondents with a new working period or ≤5 years, namely 50% or 15 respondents. In the results of the chi square test, there is a significant relationship between years of service and respiratory complaints in workers in the production department of PT. X with Pvalue 0.017 (≤0.05) and PR obtained 1.600. This value shows that respondents with long work experience are at risk of 1,600 times to have respiratory complaints.

The results of this study are in line with research that has been conducted by Putri (2018), that work period has a significant relationship with respiratory complaints with a Pvalue of 0.005. This is also in line with research conducted by Septantiana and Asfawi (2015) which said that there is a relationship between length of work and respiratory complaints with a Pvalue of 0.01. In addition, this research is in line with Christina's research (2016) on parking attendants at the Blok M Mall which states that there is a relationship from work tenure with complaints of respiratory problems with a Pvalue of 0.011 where in this study parking attendants who are always exposed to dust with long working periods are at risk of 8. times greater in the new working period.

Based on the findings of facts in the field, it was found that respondents had worked the longest, namely for 35 years. The longer a person works, the more likely it is to become tired while doing a job. This needs to be considered because when the body is tired, physical activity is reduced so that the body is prone to health problems, one of which is respiratory problems (Medyati, 2023). Khumaidah (2013) said that the longer an individual works, the more risks are taken from hazards in the work environment such as dusty working conditions with concentration and quite a long time. This will have negative effects such as coughing and shortness of breath that a person can feel due to inhaled dust. (Fauziah et al., 2020).

4.5 Relationship between Use of Mask with Respiratory Complaints

Based on the results of field research, it showed that 95.7% or 67 respondents used masks more than respondents who did not use masks, namely 4.3% or 3 people. This is in line with research conducted by Annashr et al., (2022) where more workers have used masks while working, namely as much as 92.1%.

In this study the results of bivariate analysis showed that respondents who wore masks while working experienced more respiratory complaints, namely 67.2% or 45 respondents compared to respondents who did not use masks, namely 66.7% or as many as 2 people. The results of the chi square test showed that there was no significant relationship between the use of masks and respiratory complaints of workers in the production department of PT. X Citeureup with a Pvalue of 1.000 (>0.05).

The results of this study are in accordance with the research of Septantiana and Asfawi (2015) showing that there is no relationship between the use of masks and respiratory complaints with a Pvalue of 0.116. In addition, Annashr et al., (2022) which showed the use of masks was not associated with respiratory problems in workers which had a Pvalue of 1,000. This is because in this study almost all workers used masks while working, thereby reducing dust deposits that enter the lungs and can reduce the decrease in lung vital capacity.

According to Suma'mur, the use of PPE in the form of a mask prevents the incorporation of particulate matter that contaminates the lungs, so that the use of the mask itself can reduce the chances of workers experiencing respiratory tract disorders (Muhith, 2018). In research that has been done, the use of masks is not a factor in the occurrence of respiratory complaints, because almost all workers wear masks while working. Based on data in the field, respondents are aware of the importance of using a good mask as evidenced by 54.3% of respondents already wearing type N95 masks and 23.9% of respondents already wearing medical masks where both masks have a higher ability to filter air. PT. X has obligated his workers to always use PPE in the work environment such as safety shoes, vests, helmets, and of course masks. The supply division at the company provides personal protective equipment, especially masks for workers to use. Regulations regarding the use of masks are also very strict, this is shown by the regular inspections carried out by the Safety, Security, Health and Environment Department.

4.6 Relationship between Length of Exposure with Respiratory Complaints

Based on the results of the study, it was shown that respondents with duration of exposure that were below the duration or ≤.8 hours per day were more, namely 50 people (71.4%) compared to respondents who exceeded the duration of exposure per day or >8 hours, namely 20 respondents (28.6 %). This is in line with research conducted by Budiyono (2020) where the duration of exposure ≤.8 hours per day is 91.7% more than the duration of exposure > 8 hours per day.

In this study, the results of bivariate analysis showed that respondents with longer duration of exposure were below exposure duration or ≤8 hours per day more, namely 36 respondents or 72% compared to respondents with longer exposure duration exceeding exposure duration or >8 hours per day, namely as many as 11 respondents or 55%. The results of the chi square test showed that there was no significant relationship between length of exposure and respiratory complaints among workers in the production department of PT. X Citeureup with Pvalue 0.277 (> 0.05).

The results of this study are in line with research conducted by Asrina (2015) which showed that the P-value between the duration of exposure and the incidence of pulmonary function was 0.084, meaning that there was no significant relationship between the duration of exposure and respiratory complaints.

According to (Putri, 2018) the exposure dose received by each worker is different. The amount of exposure dose that enters the body is not determined by how long the worker is exposed or not. Workers who work with exposure for more than 8 hours a day do not necessarily experience respiratory problems. This is supported by Fauziah's research (2020) which proves that there is no relationship between length of exposure and complaints of respiratory problems with a Pvalue of 0.084 because working hours are appropriate, namely 8 hours per day and work shifts are enforced.

According to Suma'mur (2013) who said that the causes of health problems caused by exposure to chemical particles such as dust are not only due to the physical and chemical properties of the particles, but are also seen based on the special factors of the workers themselves. There is no relationship between the length of exposure and respiratory complaints because the occurrence of respiratory complaints is not only influenced by the length of individual exposure, but it is possible that there are other factors such as differences in worker characteristics and individual susceptibility to respiratory complaints themselves. Exposure time is not a factor in the occurrence of respiratory complaints, because PT. X himself has implemented a maximum working hour per day of 8 hours in accordance with Law no. 13 of 2003 concerning employment.

4.7 Relationship between Smoking Habits with Respiratory Complaints

The results showed that there were more respondents with smoking habits, namely 42 respondents (60%) compared to respondents who did not smoke, with a total of 28 respondents (40%). This is in line with research conducted by Fujianti et al., (2015) where respondents with smoking status were 84.8% more

Based on the bivariate analysis that has been done, 78.6% of respondents who have smoking habits or 33 respondents experience more respiratory complaints compared to respondents who do not have smoking habits, namely 14 respondents (50%). The results of the chi square test obtained a Pvalue of 0.026 (≤0.05) and showed a relationship between smoking habits and respiratory complaints in workers in the production department of PT. X Citeureup with a PR of 1.571 or in other words someone with smoking habits has a 1.571 times greater risk of experiencing respiratory complaints compared to someone who does not smoke.

This is in line with research conducted by Putri et al., (2017) which stated that there was a significant relationship between smoking habits and complaints of respiratory problems with a Pvalue of 0.006 (≤0.05). Then Sari et al., stated that smoking habits are associated with complaints of respiratory problems in factory workers (Pvalue 0.004). Medyati's research (2023) also states that smoking habits are associated with symptoms of respiratory problems with a Pvalue of 0.037 where in this study the respondents who smoked spent the most 1 pack of cigarettes or 12 cigarettes per day, which was 67.6%.

Some of the studies above show results that are in line with this study. In this study, 60% of the respondents smoked, meaning that 60% of the workers in the production section had toxic substances in cigarettes. This toxin will accumulate in the body, especially the lungs. In the presence of toxins, the process of exchanging oxygen gas with carbon dioxide will be hampered and reduce the function of the alveoli which plays a role in the respiration process. This condition has an impact on the decrease in lung organ function so that respiratory complaints can occur.

This is also evidenced by the large number of cigarettes smoked by respondents where most respondents smoked 6-12 cigarettes/day or were included in the category of moderate smokers at 24.3%. Therefore, this smoking habit is a factor in the occurrence of respiratory complaints in workers.

5 CONCLUSIONS

The results showed that 67.1% of respondents experienced respiratory complaints. 77.8% with a vulnerable age, 80% with a long working period, 67.2% with the habit of wearing a mask while working, 72% with a long exposure of ≤8 hours/day and 78.6% with smoking habits. The measurement result for the highest dust content in the packing unit was 4.72 mg/m3. In addition, there is a relationship between age (Pvalue=0.023), years of working (Pvalue=0.017), and smoking habits (Pvalue=0.026) with respiratory complaints. There is no relationship between the use of masks (Pvalue=1.000) and length of exposure (Pvalue=0.277). Suggestions in this study are that companies can put more emphasis on their workers to carry out medical checkups so that workers' personal health is evaluated and can apply regulations not smoking / reducing smoking consumption in workers.

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THE PRECEDE – PROCEED THEORY IN DETERMINING THE CONSUMPTION OF SUGAR – SWEETENED BEVERAGES IN ADOLESCENTS AT SMPN 182 JAKARTA IN 2022

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Keywords: Adolescent, Enabling Factor, Pre-disposing Factor, Reinforcing Factor, Sugar – Sweetened Beverages.

Abstract: Consuming sugar-sweetened beverages (SSBs) can be a major contributor to increased intake of added sugar which is associated with the occurrence of nutritional problems, one example of which is obesity. Consumption of SSBs can be influenced by several factors. In the Precede-Proceed theory, various factors have the potential to influence certain behaviors, namely predisposing factor. The purpose of this study was to determine the relationship between the factors contained in the Precede-Proceed theory in determining the consumption of SSBs in adolescents at SMPN 182 Jakarta in 2022. This study has a cross-sectional design. The research sample was 193 students of class VII and VIII of SMPN 182 Jakarta. Data analysis techniques used statistical tests with the chi-square test. Data on nutritional knowledge, access, peer influence, and social media were obtained by filling in the questionnaire independently, while data on the consumption of SSB was obtained by interviewing using the food frequency questionnaire (FFQ) form. Based on the data analysis, a significant relationship exists between nutritional knowledge, access, and peer influence on SSB consumption. However, there is no significant relationship between social media and the consumption of SSBs.

1 INTRODUCTION

Consuming sugar-sweetened beverages can play a significant role in contributing to the higher intake of added sugars, which is linked to an elevated risk of obesity. Indirectly, sugar can elevate energy intake, leading to a positive energy balance where the input of energy surpasses the output. This imbalance can lead to the accumulation of fat and subsequent weight gain (Veronica & Ilmi, 2020). Obesity is also connected to a heightened risk of developing various other health conditions, including diabetes mellitus, heart disease, stroke, hypertension, and cancer (Lestari, 2017).

Teenagers represent one of the largest consumer groups for sugar – sweetened beverages (SSBs) Research conducted at SMPN 11 Jakarta among students revealed that a significant 60.6% of the respondents fell into the category of consuming sweetened drinks excessively (Nurjayanti et al., 2020).

Sweetened drinks or Sugar-Sweetened Beverages (SSBs) are drinks that have a high level of calories and sugar but provide little nutrition (Sari et al., 2021). Types of sweetened drinks include carbonated drinks, fruit-flavored drinks, sports drinks, energy drinks, packaged tea, packaged coffee with added sugar, and modern beverages such as milk tea mixed with bubble/boba and thai tea (Mufidah, 2021).

Indonesia occupies the third rank in the Southeast Asia region for the consumption of sweetened drinks, with an average consumption of 20.23 liters per person per year (Fanda et al., 2020). According to the SUSENAS results over the span of four years, from 2018 to 2021, the highest consumption participation at the national level is represented by the percentage of the population consuming the processed food and beverage group. The annual percentages for this category are 99.29%, 99.32%, 99.23%, and 99.02%. Based on (RISKESDAS) data, it was found that 61.86% of individuals within the age range of 10-14 years and 56.43% within the age range of 15-19 years consume sweet drinks at least once per day (Riskesdas, 2018).

The Precede-Proceed theory, developed by Green and Kreuter, explains that health behavior is influenced by individual factors and environmental factors (Pakpahan et al., 2021). In the Precede-Proceed theory, several factors can determine a person's behavior, including predisposing factors such as knowledge of nutrition, reinforcing factors like the influence of peers and social media, and enabling factors such as access (Irwan, 2017).

Knowledge of nutrition encompasses an awareness of various aspects such as food composition (nutrient content), processing techniques, and food safety, along with the fundamental principles of maintaining a healthy lifestyle (Aulia, 2021). A study conducted at SMPN 11 Jakarta revealed that participants with lower levels of nutritional knowledge were 1.50 times more likely to consume higher quantities of SSBs (Nurjayanti et al., 2020).

Pipes' theory in 1985, as found in the research by Alhidayati et al. (2017), explains that adolescents' eating and drinking habits are influenced by convenient access to ready-to-consume food and beverages. Based on the research conducted at SMPN 5 Pekanbaru, it was explained that the likelihood of soft drink consumption among respondents with easy access to them is believed to be three times higher than among respondents who face difficulties in accessing soft drinks (Alhidayati et al., 2017).

Friendship can influence food choices. A study carried out at junior high schools in the Bekasi area revealed a noteworthy connection between the frequency of consuming soft drinks and peer influence. The study revealed that 76 respondents opted to consume soft drinks after observing their friends purchasing them (Meiriasari. & Mulyani, 2013).

Social media serves as a platform for promoting and marketing products, enabling marketers to engage with their customers (Nurjayanti, 2019). This media exerts a substantial impact on snack preferences. Research conducted in Bali revealed a direct link between the content of Instagram messages and the snacking habits of teenagers (Masitah & Sulistyadewi, 2020).

Based on a preliminary study conducted at SMPN 182 Jakarta, it was found that 37.5% of students consumed sweetened drinks with a frequency of ≥ 3 times per week. Excessive consumption of SSBs can cause several health problems for the human body. Because of this, the authors are interested to see the relationship between the PRECEDE – PROCEED theory in determining the consumption of SSBs among students of SMPN 182 Jakarta in 2022.

2 METHOD

2.1 Design

This study employed a cross-sectional study design, which is primary data taken at one time and was conducted at SMPN 182 Jakarta from October to December 2022.

2.2 Subject

The population in this study were all students of classes VII and VIII at SMPN 182 Jakarta, totaling 193 respondents in the sample. The sampling method using a combination of purposive sampling techniques and unproportionate stratified random sampling. The inclusion criteria in this study were students who are in classes VII and VIII at SMPN 182 Jakarta during the 2021 – 2022 academic year and still active as students, were willing to participate as respondents in this study and have consumed sugar-sweetened beverages (SSBs). Furthermore, the study's exclusion criteria included respondents with physical and mental limitation, as well as respondents who withdrew from the research process.

2.3 Dependent Variable

The dependent variable in this study is the consumption of sugar - sweetened beverages (SSBs). Data concerning the consumption of sweetened beverages (SSBs) was collected through interviews using the Food Frequency Questionnaire (FFQ) form. The results were obtained into frequent (≥7 times per week) and not frequent (< 7 times per week) (Hardiansyah et al., 2017).

2.4 Independent Variable

In this study, there are several independent factors, including nutritional knowledge, access, peer influence, and social media. The data collection for the four factors was carried out by having the questionnaire filled in independently by the respondents.

Data related to nutritional knowledge will be categorized as moderate, poor, and good, and then composited into moderate-less (< 80% correct answers) and good categories (≥ 80% correct answers) (Khomsan, 2021). For the access variable, the measurement results are categorized into easy access and difficult access. For the peer influence variable, the data results are categorized as influenced and not influenced (Fauzia, 2012). Data related to the use of social media is categorized into high or low (Karmila, 2020).

2.5 Data Analysis

This study uses a software application to analyze data, namely SPSS Statistics 25. There are two analyses in this study, namely univariate analysis and bivariate analysis. In this study using the chi-square (x^2) statistical test.

3 RESULT

3.1 Description of Characteristics, Nutritional Knowledge, Access, Peer Influence, Media Social and Consumption of Sugar-Sweetened Beverages (SSBs)

Below is a table 1, that describes the characteristics of the respondents (sex and age).

Table 1: Respondent Characteristics

Characteristics	n	%
Sex		
Male	72	37.3
Female	121	62.7
Total	193	100.0
Age (year)		
12	27	14
13	103	53.4
14	62	32.1
15	1	0.5
Total	193	100.0

Based on Table 1, it can be observed that there are more female students (62.7%), and the majority of respondents are 13 years old (53.4%). Then, table 2 describes an overview of sugar-sweetened beverages (SSBs) drink consumption, nutritional knowledge, access, peer influence, and social media.

Table 2: Description of Consumption of Sugar-Sweetened Beverages (SSBs), Nutritional Knowledge, Access, Peer Influence, and Social Media Usage.

Variabels	n	%
Consumption of SSBs		
Frequent	145	75.1
Not Frequent	48	24.9
Nutritional Knowledge		
Good	36	18.7
Moderate	73	37.8
Poor	84	43.5
Access		
Easy	165	85.5
Difficult	28	14.5
Peer Influence		
Influenced	117	60.6
Not Influenced	76	39.4
Social Media Usage		
High	75	38.9
Low	118	61.1

Table 2 shows that a higher proportion of students frequently consume sugar-sweetened bevareges (SSBs), possess poor nutritional knowledge, had easy access, and are influenced by peers. In contrast, a larger number of students exhibit low use of social media.

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Table 3: Relationship between Nutritional Knowledge and Consumption of Sugar-Sweetened Beverages (SSBs).

Nutritional knowledge	Consumption of SSB						P value	PR (95% CI)
	Frequent		Not frequent		Total			
	n	%	n	%	n	%		
Moderate - Poor	128	81.5	29	18.5	157	100	0.000	1.726 (1.213-2.458)
Good	17	47.2	19	52.8	36	100		

Table 4: Relationship between Access and Consumption of Sugar-Sweetened Beverages (SSBs).

Access	Consumption of SSB						*P value*	PR (95% CI)
	Frequent		Not frequent		Total			
	n	%	n	%	n	%		
Easy	131	79.4	34	20.6	165	100	0.002	1.588 (1.088-2.318)
Difficult	14	50	14	50	28	100		

Table 5: Relationship between Peer Influence and Consumption of Sugar-Sweetened Beverages (SSBs).

Peer Influence	Consumption of SSB						*P value*	PR
	Frequent		Not frequent		Total			
	n	%	n	%	n	%		
Influenced	98	83.8	19	16.2	117	100	0.001	1.354 (1.116-1.644)
Not Influenced	47	61.8	29	38.2	76	100		

Table 6: Relationship between Social Media and Consumption of Sugar-Sweetened Beverages (SSBs).

Social Media Usage	Consumption of SSB						*P value*	PR (95% CI)
	Frequent		Not frequent		Total			
	n	%	n	%	n	%		
High	61	81.3	14	18.7	75	100	0.126	1.143 (0.976-1.338)
Low	84	71.2	34	28.8	118	100		

3.2 Relationship Between Nutritional Knowledge and Consumption of Sugar-Sweetened Beverages (SSBs)

Table 3 shows the outcomes of bivariate analysis concerning the relationship between nutritional knowledge and sugar-sweetened beverages (SSBs) consumption among respondents. Based on the results of statistical tests, there is a significant relationship between nutritional knowledge and the consumption of sugar-sweetened beverages (p-value < 0.005).

3.3 Relationship Between Access and Consumption of Sugar-Sweetened Beverages (SSBs)

Table 4 shows the outcomes of bivariate analysis concerning the relationship between access and sugar-sweetened beverages (SSBs) consumption among respondents. Based on the results of statistical tests, there is a significant relationship between access and the consumption of sugar-sweetened beverages (p-value < 0.005).

3.4 Relationship Between Peer Influence and Consumption of Sugar-Sweetened Beverages (SSBs)

Table 5 shows the outcomes of bivariate analysis concerning the relationship between peer influence and sugar-sweetened beverages (SSBs) consumption among respondents. Based on the results of statistical tests, there is a significant relationship between peer influence and the consumption of sugar-sweetened beverages (p-value < 0.005).

3.5 Relationship Between Social Media and Consumption of Sugar-Sweetened Beverages (SSBs)

Table 6 shows the outcomes of bivariate analysis concerning the relationship between social media and sugar-sweetened beverages (SSBs) consumption among respondents. Based on the results of statistical tests, there is no significant relationship between social media and the consumption of sugar-sweetened beverages (p-value > 0.005).

4 DISCUSION

Knowledge is one of the factors included in the PRECEDE-PROCEED theory, more precisely on the predisposing factor. Based on the results of this study, it is evident that respondents who consumed sugar-sweetened beverages (SSBs) with frequent frequency came from respondents who had moderate to poor nutritional knowledge (81.5%). These findings align with a study conducted at a junior high school, which found that there was a significant relationship between nutritional knowledge and the level of consumption of sugar-sweetened beverages. Knowledge about nutrition and health in adolescents is still limited. If individuals have limited knowledge about nutrition, they will face difficulties in paying attention to the nutritional content of each food package and tend to ignore the nutritional value of these foods(Nurjayanti et al., 2020).

Related to this explanation can also be seen in this study, based on the answers to the nutritional knowledge questionnaire. Of all the questions, the most wrong answers were found in the point question "Consuming packaged coffee and packaged tea every day has a good impact on the body". With good nutritional knowledge, a person tends to have a good attitude in choosing food and snacks (Laenggeng & Lumalang, 2015).

Enabling factors in precede-proceed theory are factors that enable behavior and access to be one of the examples included in it. At SMPN 182 Jakarta there is a canteen that sells various types of sweetened beverage products. With easy access and increasingly diverse beverage products, it will affect consumption in adolescents (Pamarta, 2022).

Based on the results of this study, it can be seen that subjects who consume sugar-sweetened beverages with frequent frequency are more likely to come from subjects who have easy access (79.4%). In line with research conducted by Pamarta (2022), there is a significant relationship between access and the level of consumption of sweetened drinks. Product availability can be a factor that affects a person's consumption level, the better the level of availability of a product, the higher the consumer's preference for consuming the product (Hidayat & Dewi., 2021).

Peer influence is an example of a reinforcing factor. This factor is a factor that appears after the behavior occurs. The results of the study showed that the subjects who consumed sugar-sweetened beverages with frequent frequency were more students who had peer influence (83.8%). In line with research conducted by Alhidayati et al. (2017) found a significant relationship between the influence of peers and the consumption of soft drinks in junior high school students. Teenagers generally have a high sense of curiosity and tend to try new things. They often spend their daily time with playmates or peers. The characteristics of adolescents who like to make friends and in groups can influence the formation of behavior. In a group of friends, this also has an impact on food and drink choices, such as a preference for consuming certain drinks (Masri, 2018).

Social media is an example of a reinforcing or accompanying factor in changing behavior or actions in consuming sugar-sweetened beverages. One of the places or containers for promoting sweetened beverage products to attract consumers' attention to buy and consume these products is social media. In this study, the use of social media was low due to the use of mobile phones or tablet PCs during study hours. With this regulation, respondents can only operate their mobile phones during school hours or when there are instructions from the teacher with learning objectives. The results of this study indicate that the subjects who consumed sweetened drinks with frequent frequency were more respondents with low social media use (71.2%). In line with research conducted by Istighfarin et al., (2021) that there is no significant relationship between promotion and the decision to purchase a product. Promotion is a communication activity that aims to introduce something to the public and at the same time influence the public to buy and use the product. Although promotion is important in

marketing, not all purchasing decisions are influenced by promotion (Istighfarin et al., 2021). By the theory of Precede-Proceed, health behavior is influenced by several factors, both individual and environmental. The results of this study explain that the PRECEDE-PROCEED theory has an impact on the behavior of sugar-sweetened beverages (SSBs) consumption, supported by related factors that influence this behavior. Some factors included in this study are nutritional knowledge (predisposing factor), access (enabling factor), peer influence and social media (reinforcing factor). Among these factors, only social media does not affect sweet beverage consumption. Social media often contains promotions for food or beverage products, which are done to attract consumer attention. Promotion is important, but not all purchasing decisions are influenced by promotions (Istighfarin et al., 2021). The decisions made by individuals are an example of attitudes that are included in the Precede-Proceed theory, where predisposing factors are one of the considerations of an individual that influence the occurrence of a behavior (Pakpahan et al., 2021).

5 CONCLUSIONS

In this study, there is significant relationships exist between nutritional knowledge, access, and peer influence with the consumption of sugar-sweetened beverages (SSBs), while there is no significant relationship between social media and the consumption of sugar-sweetened beverages (SSBs). From this study, it can also be concluded that the PRECEDE-PROCEED theory influences the behavior of sugar-sweetened beverage (SSBs) consumption.

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REINFORCING FACTORS IN DETERMINING ULTRA-PROCESSED FOOD CONSUMPTION OF STUDENTS AT SMAN 60 SOUTH JAKARTA IN 2023

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Keywords: Ultra-Processed Food, Peer Group Support, Social Media, Family Support

Abstract: A study on the factors influencing ultra-processed food consumption habits in students aged 16-18 years old. This study aims to determine the factors that influence the ultra-processed food consumption habits of student. This was a cross sectional study involving high school students aged 16 to 18 years. This study used food frequency questionnaires and questionnaires to determine influencing factors. This study used stratified random sampling technique. Food consumption was categorized and processed using SPSS software. The participating respondents were 132 students from the total population. It was found that the largest type of UPF consumption was the sauces and seasonings group at 9.1 times per week. There was no significant relationship between social media exposure and average UPF consumption per day with a p value = 0.302. There was a significant relationship between peer group support and average daily UPF consumption with a p value = 0.031. There is no significant relationship between family support and average UPF consumption per day with a p value = 0.115. Key aspects derived from the study, all respondents fell into the category of frequent UPF consumption with a frequency of 3.1 times per day.

1 INTRODUCTION

Ultra-processed food is food that is processedwith the addition of coloring agents, preservatives and other flavorings with the aim of removing its natural form (Marrón-Ponce et al., 2018). The study mentioned that ultra-processed food is a processed food innovation with high energy density, fat, natirumand high sugar content and has low fiber, vitamins, minerals (Monteiro et al., 2019). Today the food industry is growing very rapidly food manufacturinginnovations are increasingly diverse from home industries to large industries. Through a survey conducted by Mondelēz International titled The State of Snacking 2020, where the average UPF consumption of Indonesians is 2.7 points while heavy food is only at 2.5 points where UPF consumption should be smaller than heavy food. This can have various impacts on health, especially among adolescents.

Excessive consumption of ultra-processed food in adolescents will lead to various problems in the future where the food consumed by adolescents tends to be high in fat, carbohydrates, sodium and high in sugar. This is one of the causes of nutritional problems and changes in eating habits in adolescence (Setyobudi et al., 2018). The snack food industry in Indonesia increased from 8.46% in 2016 to 9.23% in 2017 (Azizah, 2022). According to a study conducted by Faza et al., (2023) found that UPF accounted for about 16% of total daily calories and the proportion of added sugar from UPF was 23.3%. As for the classification of ultra-processed food according to NOVA. According to NOVA, food products are classified into four groups based on the level and purpose of their processing industry. The four groupsare: Unprocessed or minimally processed foods, Processed food ingredients, Processed foods and Ultra-processed food and beverage products. NOVA considers all physical, biological and chemicalmethods used during the food manufacturing process (Monteiro et al., 2019).

2 SUBJECT AND METHODS

This research is a quantitative study using a cross-sectional study design. The population of this study were students aged 16-18 years at SMAN 60 Kemang South Jakarta with the sample size determined using stratified random sampling to determine the number of samples using the Lameshow formula the research uses a two-proportion test, the sample results need to be multiplied by 2 to 120 samples and added 10% to avoid dropouts to 132 samples. The data used were FFQ questionnaire, social media advertising exposure questionnaire, peer group support questionnaire and family support questionnaire obtained through interviews. Prior to data collection, this study was approved by the UHAMKA Health Research Ethics Committee.

Data related to the frequency of UPF consumption among students of SMAN 60 by looking at REINFORCING factors according to LAWRENCE GREEN'S theory that can affect the frequency of consumption. The questionnaires used in this study are characteristics questionnaire (age, gender, parents' education, pocket money), FFQ questionnaire interview, social media exposure questionnaire, peer group support questionnaire and family support questionnaire. Using a Likert scale from 1-5.

3 RESULT

Based on the results of this study obtained:

Table 1 Overview of Student Characteristics of SMAN 60 South Jakarta 2023

Characteristics	n	%
Age		
16 years	98	74,2
17 years	31	23,5
18 years	3	2,3
Total	132	100
Sex		
Boy	61	46,2
Girl	71	53,8
Total	132	100
Parent Education		
Senior High School	68	50,8
College	66	42,6
Total	132	100
Pocket Money		
Low (40.000≤median)	91	68,9
High (40.000>median)	41	31,1
Total	132	100

The table above shows that the characteristics related to the age of most respondents are 16 years old (74.2%). The gender of respondents is 53.8% female, the most family education is in high school 50.8%. The characteristics of pocket money obtained a median of 40,000 with a low category of 68.9%.

Table 2 Frequency of UPF consumption/week

Food Type	Frequenc
milk and its derivatives	2,8
Candy and chocolate	3,5
Cereal	1,4
Bread	7
Meat and poultry	2,1
Fish or Processed fish	0,03
Sauce and Seasoning powder	9,1
Drink powder andConsentart	3,5
Drink	4,2
Snack	8,4
Fast Food	8,4

Based on the table above, it shows that the frequency of the type of UPF that is consumed the most in 1 week in the first place is sauce and flavoring powderat 9.1.

Table 3 Overview of social media

Category	n	%
Exposed (≥12 median)	93	70,5
Unexposed (<12 median)	39	29,5
TOTAL	132	100

Based on the table above, the number of respondents exposed to social media is 70.5%.

Table 4 Overview of the influence of peer groupsupport

Category	**n**	**%**
Influenced PGS (*peer group support)* (≥14 median)	51	38,6
Uninfuenced PGS (<14 median)	81	61,4
TOTAL	132	100

Based on the table above, the number of respondents whoare not affected by peer group support is 61.4%

Table 5 Family support overview

Category	n	%
Good (≥16 median)	73	55,3
Not Good (<16median)	59	44,7
TOTAL	132	100

Based on the table above, the number of respondents with good family support was 55.3%. To determine the relationship between variable susing the mann whitney U test following table results.

Table 6 Differences in frequency of UPF consumption per day based on social media exposure

	Social Media	n	Mean	Std	P value
Average of UPF Consumption	Exposed	93	2,95	1,346	0,302
	Unexposed	39	3,20	1,380	

Based on the results of table above, it is known that the average consumption of UPF exposed to social media is 2.95 times / day while the average consumption of UPF exposed to social media is 2.95 times / day while the average consumption of UPF not exposed to social media is 3.20 times / day. The mann-whitney test results show that there is no significant difference between the two, this is indicated by the p-value> 0.005 (0.302).

Table 7 Differences in frequency of UPF consumption per day based on peer group support

	Peer group support	n	Mean	Std	P value
Average of UPF Consumption	Influenced	51	3,15	1,357	0,031
	Uninfluenced	81	2,54	1,261	

Based on the results of the table above, it is known that the average UPF consumption affected by peer group support is 3.15 times / day while the average UPF consumption that is not affected by peer group support is 2.54 times / day. The mann-whitney test results show a significant difference between the two, this is indicated by a p-value <0.005 (0.031).

Table 8 Differences in frequency of UPF consumption per day based on family support

	Family Support	n	Mean	Std	P value
Average of UPF Consumption	Good	73	2,88	1,374	0,115
	Not Good	59	3,20	1,323	

Based on the results of the table above, it is known that the average consumption of UPF with good family support is 2.88 times / day while the average consumption of UPF with poor family support is 3.20 times / day. The results of the mann-whitney test showed that there was no significant difference between the two, this was indicated by a p-value> 0.005 (0.115).

4 DISCUSSION

The results of this study conducted on adolescents aged 16-18 years at SMAN 60 South Jakarta showed that all respondents, namely 132 students, consumed UPF with an average frequency of consumption of UPF as much as 3x a day**.** According to a study conducted by Faza et al., (2023)found that UPF accounted for about 16% of total daily calories and the proportion of added sugar from UPF was 23.3%. Based on the results of the study there is no significant relationship between exposure to social media and average consumption of upf (p-value = 0,302). This is not in line with research conducted by Subagyo & Dwiridotjahjono (2021) where consumptive behavior is positively and significantly influenced by online advertising, based on the results of the first hypothesis test (Ha1).

Based on the results of the study there is a significant relationship between peer group suppo and average consumption of upf (p-value = 0,031). This is in line with research conducted by Rahman et al., (2021) which states that peer group support has a positive and significant effect on fast food consumption behavior with a value of (p = 0.048).

There is no significant relationship between family support and UPF consumption in this population. This is in line with research conducted by Fatmasari (2017) which states that there is a significant relationship between family support and the snacking behavior of Solok city school students. Because families or households with good food availability and eating habits tend to consume higher quality and adequate food.

5 CONCLUSION

Derived from the study, all respondents fell into the category of frequent UPF consumption with a frequency of 3 times per day. The type of UPF with the most consumed frequency is sauce and flavoring powder at 9.1. Univariate results showed that 74.2% of respondents were 16 years old. 53.8% were female. There were 50.8% of respondents with parents who had a high school education. There were 68.9% of respondents who had low pocket money (≤40,000). The results between social media exposure in determining UPF consumption show that there is no significant relationship between social media exposure and UPF consumption. The results between peer group support in determining UPF consumption show that there is a significant relationship, and family support factors in determining UPF consumption show that there is no significant relationship.

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THE RELATIONSHIP BETWEEN CONSUMPTION OF SNACK (NUTRITIONAL FACT) AND THE NUTRITIONAL STATUS OF ADOLESCENTS AT SMA TAMAN HARAPAN 1 BEKASI

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Keywords: Sugar, Salt, Fat, Snack, Nutritional, Fiber.

Abstract: Introduction: Adolescent who fall into the age category of 10-19 years have a tendency to buy food at school. Consumption of unhealthy snack foods will affect nutritional status. snack foods usually contain high fat, sugar, salt and low fiber. The purpose of this study was to determine the relationship between consumption of sugar, salt, fat and fiber from snacks with nutritional status in adolescents. The samples in this study were 72 students class X and XI aged 16-18 years at SMA Taman Harapan 1 Bekasi. Sampling is done by quota sampling. The research methods used are observational analytic with cross-sectional design. The questionnaire used for variable nutritional status, sugar intake, salt intake, fat intake, fiber intake, snacks. The instruments used in this study were in the form of questionnaires, step scales, microtoise and SQ-FFQ forms. The data used is primary and secondary data. Data analysis techniques are conducted with the Chi Square test. The Data to be analytic is the intake of sugar, salt intake, fat intake and fiber intake of snacks with nutritional status. The results of this study showed that most respondents had more nutritional status (41.7%), more sugar consumption (62.5%), more salt consumption (59.7%), adequate fat consumption (61.1%), and low fiber consumption (84.7%). The results of the Chi-square test showed that there was a relationship between sugar consumption(p=0,000), salt consumption (p=0,000), fat consumption(p=0,000) and fiber consumption(p=0,046) with nutritional status in students at SMA Taman Harapan 1 Bekasi City. The suggestion is that adolescents can reduce the consumption of snacks to prevent overweight.

1. INTRODUCTION

Adolescents who fall into the age category of 10-19 years have a tendency to buy food at school (WHO, 2014). Adolescents basically have various lifestyles, behaviors and experiences in choosing what food to eat at school (Sukma and Margawati, 2014). The purchase of snacks at school is due to the dense time children spend at school and 90% buy snacks at school (BPOM, 2011; WHO, 2014). Children 5-19 years old who are obese are 39.0%, with more obese women (40.0%) than men (38.0%) (WHO, 2015). According to Riskesdas in 2018 shows that the prevalence of underweight 7.03%, normal 77.56% and obesity and obesity in adolescents 16-18 years in West Java were 10.90% obese and 4.51% obese respectively and for the Bekasi City area the prevalence of underweight 7.14%, normal 75.45% and obese as much as 11.28% and 6.13% obese (Riskesdas, 2018). This figure can be concluded that in West Java province, namely Bekasi City, there is a problem of nutritional status in adolescents that must be considered.

Factors that influence nutritional status in adolescents include consumption of snacks high in fat, sugar, salt and low in fiber (Nisak and Mahmudiono, 2017). Nutritional status is closely related to a person's food intake, especially in foods that contain high calories such as sugar and fat. And there is sodium intake, making people consume more food. Foods lacking salt taste different from those with salt. With a long period of time, it will cumulatively cause obesity (Atmarita, et al, 2016). Someone who consumes low fiber tends to consume high fat, causing overnutrition. Because fat is easily digested compared to fiber (Setyawati and Rimawati, 2016).

Indonesian Ministry of Health Regulation No. 30 of 2013 recommends a daily intake of no more than 50 grams of sugar, no more than 2000 milligrams of salt and no more than 67 grams of fat (Permenkes, 2013). consumption of private primary school students a day from snacks consumed when compared to Permenkes RI No. 30 of 2013, fulfills 81.2% sugar consumption, 44% salt consumption and 35.8% fat consumption from the daily limit, then in public primary schools the consumption of Sugar, Salt and Fat from snacks in one day fulfills 130.6%, 86% and 65.7% (Puspita and Adriyanto, 2019). It can be concluded, only from snacks, consumption has exceeded 50% of the recommended intake in a day, namely sugar intake of 50 grams / day, salt intake of 2000 grams / day and fat intake of 67 grams / day (Permenkes, 2013). In fact, snack food should be 5-10% of the daily energy and nutrient needs (Fikawati, sandra, et al, 2017).

The results of the 2018 Riskesdas in Bekasi show that the proportion of people consuming sugary foods and drinks was 41.69% and 63.35% respectively, salty foods 30.99% and fatty foods 36.86% and no fiber consumption 10.93%. When compared to 2013, the proportion who consumed sugary foods/beverages was 55.6%, salty foods 28.3% and fatty foods 48% and did not consume fiber 2.2%. It can be concluded that sugar consumption, salty consumption and no fiber consumption increased, while fat consumption decreased slightly from 2013 (Riskesdas, 2018).

2. SUBJECTS AND METHODS

The focus of this research is the relationship between consumption of sugar, salt, fat and fiber from snacks with nutritional status in adolescents. The populations of this study included students class X and XI at SMA Taman Harapan 1 Bekasi. The samples in this study were 72 students aged 16-18 years. Sampling is done by quota sampling. The research methods used are observational analytic with cross-sectional design. The questionnaire used for variable nutritional status, sugar intake, salt intake, fat intake, fiber intake, snacks. The instruments used in this study were in the form of questionnaires, step scales, microtoise and SQ-FFQ forms. The data used is primary and secondary data. The data analysis technique is the Chi Square test. The data analyzed were Consumption of sugar, salt, fat and fiber from snack foods with nutritional status.

3. RESULTS

The results of data collection, 72 people were obtained who met the criteria as a sample. The distribution of respondents based on the characteristics of the respondents is as follows.

Table 1 Distribution of Respondents Based on Characteristics

Characteristics	n	%
Age		
16 years old	27	37.5
17 years old	34	47.2
18 years old	11	15.3
Total	72	100.0
Gender		
Male	27	37.5
Female	45	62.5
Total	72	100.0
Class		
X	27	37.5
XI	45	62.5
Total	72	100.0
Pocket Money		
<20.000	26	36,1
20.000-50.000	43	59,7
>50.000	3	4,2
Total	72	100,0

Based on the results of characteristic respondents Table 1, most respondents were 17 years old as many as 34 people (47.2%). The gender of the respondents was mostly female as many as 45 people (62.5%). Most of the 62.5% of respondents came from class XI. As many as 59.7% have pocket money ranging from Rp 20,000-Rp50,000. With this pocket money, respondents are able to buy various kinds of snacks freely.

In this study, the measurement of nutritional status was measured by the body mass index for age (BMI / A). In this study, the classification of nutritional status is divided into four categories, namely undernutrition, good nutrition, overnutrition and obesity. The results of the distribution of respondents' nutritional status are presented in table 5.2 below:

Table 2 Distribution of Respondents Based on IMT/U Nutritional Status

Nutritional Status	n	%
Overweight	8	11.1
Normal	28	38.9
Overweight	30	41.7
Obesity	6	8.3
Total	72	100.0

Based on the results of the table above, most respondents had a nutritional status of more than 30 people (41.7%) and obesity as many as 6 people (8.3%). With an average body mass indeks by age z-score of 0.5 and an average body weight of 63.8 kg.

The intake of sugar, salt, fat and fiber in this study was only analyzed from snacks and not food from home. The following distribution of respondents based on sugar, salt, fat and fiber intake at Taman Harapan 1 Bekasi High School can be seen in Table 3.

Table 3 Distribution of Respondents Based on GGL and Fiber Intake with Mean and ±SD

Variable	category	n	%	Mean	SD
Sugar intake	Over	45	62,5	51 gr	8 gr
	Adequate	27	37,5		
Natrium intake	Over	43	59,7	932 mg	326 mg
	Adequate	29	40,3		
Fat Intake	Over	28	38,9	59gr	11gr
	Adequate	44	61,1		
Fiber intake	Low	61	84,7	17 gr	5 gr
	Adequate	11	15,3		

Based on Table 3, it shows that most respondents (62.5%) have sugar intake in the more category, with an average sugar intake of 51 grams / day. Most respondents with salt intake in the more category as much as (59.7%), with an average salt intake of 1932 milligrams / day. Most of the respondents' fat intake was in the moderate category (61.1%), with an average fat intake of 60 grams/day. Most respondents (84.7%) had low fiber intake, with an average fiber intake of 16.57 grams/day.

Bivariate analysis leads to the analysis of twovariables, which is a form of statistical analysis used to determine the relationship between the two variables to be studied.

Table 4 The Relationship Between Consumption Of Sugar, Salt, Fat And Fiber From Snack Food With Nutritional Status In Adolescents

	Nutritional status					*PR (95%) CI*	***p-value***
Sugar intake	Normal		Overweight		Total		
	n	%	n	%	n	3,788	0.000
Adequate	25	92,6	2	7,4	27	(2,242-	
Over	11	24,4	34	75,6	45	6,401)	
Sodium intake	Normal		Overweight		Total		
	n	%	n	%	n	4,448	0.000
Adequate	27	93,1	2	6,9	29	(2,467-	
Over	7	16,3	36	83,7	43	8,019)	
Fat intake	Normal		Overweigh t		Total		
	n	%	n	%	N	10,818	0.000
Adequate	30	68,2	14	31,8	44	(2,818-	
Over	2	7,1	26	92,9	28	41,525)	
Fiber intake	Normal		Overweight		Total		
	n	%	n	%	n	3,066	0,022
adequate	7	63,6	4	36,4	11	0,858-	
low	27	44,3	34	55,7	61	0,953)	

Based on the results of the table above shows that more respondents overweight (75.6%) had more sugar intake than adequate sugar intake (7.4%). Chi square statistical test results showed a significant relationship between sugar intake from snacks and the nutritional status of Taman Harapan 1 Bekasi high school students with a p-value of 0.000 (p <0.05). There is a tendency that the higher the sugar intake, the greater the risk of experiencing nutritional status. Where respondents with more sugar intake are at risk 4 times to experience overnutrition (PR 3.788 = 4).

Then, more respondents with overweight (83.7%) had more salt intake than adequate salt intake (6.9%). The Chi square statistical test results showed a significant relationship between salt intake from snacks and the nutritional status of Taman Harapan 1 Bekasi high school students with a p-value of 0.000 (p <0.05). There is a tendency that the higher the salt intake, the greater the risk of experiencing more nutritional status. Where respondents with more salt intake are at risk 5 times to experience overnutrition (PR = 4.448 = 5).

Then, more respondents with overweight (92.9%) have more fat intake than adequate fat intake (31.8%). The Chi square statistical test results showed a significant relationship between fat intake from snacks and the nutritional status of Taman Harapan 1 Bekasi high school students with a p-value of 0.000 (p <0.05). There is a tendency that the higher the fat intake, the greater the risk of experiencing overweight status. Where respondents with more fat intake have a 44 times risk of experiencing overnutrition (PR = 10.818 = 11).

Then, more respondents with overweight (55.7%) had more low fiber intake than adequate fiber intake (36.4%). Chi square statistical test results showed a significant relationship between fiber intake from snacks and the nutritional status of Taman Harapan 1 Bekasi high school students with a p-value of 0.022 (p <0.05). There is a tendency that the lower the fiber intake, the greater the risk of experiencing overweight status. Where respondents with low fiber intake are at risk 3 times to experience overnutrition (PR = 3.066 = 3).

4. DISCUSSION

The results of the research location overview, this school has 2 canteens, where the canteen is a place where there is a choice of food and drinks served to consumers. Students more often go to the canteen during break time or after school hours even before entering they snack for breakfast because they don't have time to have breakfast at home. And also because school activities are from 7:00 - 14:00 pm. The canteen sells a variety of food and drinks. There are 2 types of snacks sold, namely heavy food and snacks. heavy food for example such as nasi uduk, fried rice, ketoprak, gado-gado, instant noodles, Meatballs, etc. Snacks include packaged foods (chiki, biscuits, etc.), cimol, cilor, donuts, etc. The various drinks include iced lemon tea, sweet iced tea, iced orange, iced coffee and there are packaged drinks such as tea, good day, uht milk, cimory, pop ice and others.

And the results of observations of Taman Harapan 1 Bekasi high school students, many students go to the canteen to buy snacks during recess or after school and from conducting interviews with several students, almost most of them never bring lunch from home, and are also supported by the large number of food vendors in the school canteen and outside school who sell snacks such as dumplings, ketoprak, cilor, instant noodles, meatballs and other packaged foods that contain high sugar, salt and fat and low fiber.

Snacks make a noticeable nutritional contribution to certain consumer groups, such as students and workers - groups whose activities are mostly outside and who do not have enough time to eat at home. The high frequency of snacking among young people suggests that snacking has an impact tailored to the nutritional needs of adolescents (Emilia et al., 2021). Haslina, HS (2012) stated that school snacks contribute 20-31.1% of daily energy needs. Therefore, the role of snacks as a nutritional factor in the daily diet of school children cannot be ruled out.

Based on the results, most of the respondents were 17 years old, as many as 47.2%. Teenagers of this age have great curiosity so they often want to try new things, feel restless, and dare to oppose if they feel underestimated (Mohammad Ali, 2012). This makes teenagers have many different lifestyles, behaviors, experiences in choosing what to eat.

The gender of the respondents was mostly female as much as 62.5%. Respondents in this study mostly came from class XI as much as 62.5%. Research shows that women consume more sugar than men. The study was conducted by the Indian Council of Medical Research (ICMR) - National Institute of Nutrition (NIN), Hyderabad and sponsored by the Indian International Institute of Biosciences (ILSI-India). The study found that women consume about 20.2 grams of added sugar per day, while men consume 18.7 grams of added sugar per day. Teenagers consumed 19.9 grams per day. School children eat 17.6 grams and preschool children 15.6 grams per day.

Most of the 59.7% of respondents brought money in the range of Rp 20,000 - Rp 50,000. Pocket money as a crucial factor in children's behavior in choosing snacks. the amount of pocket money given determines the number of children snacking at school. schools that implement full-day learning hours also affect the amount of pocket money received by students (Rahmadhani, 2018).

This study shows that students whose nutritional status is thin are 11.1%, good nutritional status 38.9%, overnutrition 41.7% and obesity 8.3%. This occurs due to poor food consumption such as snacks available at school that are not balanced nutritionally. The proportion of overnutrition and obesity at Taman Harapan 1 Bekasi High School shows a higher rate than the 2018 Riskesdas results in West Java, which were only 10.90% obese and 4.51% obese and from the 2018 Riskesdas results for Bekasi City, which were only 11.28% obese and 6.13% obese (Riskesdas, 2018). Adolescents aged 10 to 18 years are nutritionally vulnerable. One of them is the problem of obesity (Lestari, 2020). Obesity is a body weight that exceeds the body's energy needs due to excessive fat accumulation (Ahmad, 2017). As a result of overeating at a young age, in addition to obesity and degenerative diseases such as heart disease, diabetes, and high blood pressure, women are also likely to develop breast cancer, especially in adulthood (Burkholder, et al, 2020). In this study, more students were happy to consume snacks at school either before entering,

resting or after school in the form of foods and drinks containing sugar such as sweet iced tea, ice cream and other packaged sweet drinks and sweet snacks such as chocolate, bread and other packaged foods. Snacks that are often consumed by adolescents in this study are instant noodles and chocolate sandwiches. These foods are commonly consumed as breakfast or during breaks. One packet of instant noodles contains 10 grams of sugar and 4 grams of chocolate sandwich bread. These foods are consumed on average 6x a week, adolescents consume each of these foods for daily consumption of 9 grams of sugar in instant noodles and 3.5 grams. In addition to snacks, adolescents also often consume packaged drinks and drinks added with sugar or sweetened condensed milk such as sweetened iced tea and good day. One serving of sweetened iced tea adds 2 tablespoons of sugar or 26 grams, most respondents can consume 1-2x a day. So in a day adolescents consume 52 grams of sugar from snack drinks. This means that most adolescents have consumed sugar in excess of the daily sugar consumption recommendation of 50 grams / day (Permenkes, 2013). The results showed a significant relationship between sugar intake from snacks and the nutritional status of Taman Harapan 1 Bekasi high school students with a p-value of 0.000 (p <0.05). In line with research by Luwito and Santoso (2021) that statistically there is a significant relationship between sugar intake from drinks and obesity (p = 0.008) and (PR = 0.65). The results showed that 25% of students consumed packaged drinks in the form of tea and soft drinks whose sugar content ranged from 12-45 gr / package. In this study 38.4% of students had obese nutritional status and 18.8% of students had overweight nutritional status. The high level of consumption of sugar-containing beverages among adolescents has caused considerable concern because of the risk of increasing body weight (Luwito and Santoso, 2021). Carbohydrates as glucose storage for body cells, after which it is converted into energy. the rest of the glucose is stored in the liver in the form of glycogen which will be used in strenuous activities, but if someone excess carbohydrate intake continuously there will be a buildup of fat in adipose tissue under the skin and if not used will accumulate, causing overweight (Fridawati, 2016).

The average amount of salt intake from snacks consumed from the entire sample was 1932 milligrams, where the recommended sodium intake in a day is 2000 milligrams (Permnekes, 2013). Although the average consumption is still below the recommendation of the Permenkes, the average is quite high because it is only from food alone. The results of this study state that most respondents consume excess salt due to consumption of snack foods such as instant noodles, french fries, batagor, siomay, egg macaroni, cimol with additional ingredients namely sauce, soy sauce, and other flavorings. The snack food that contains the highest sodium and is often consumed by some respondents is instant noodles. One packet of chicken curry flavored instant noodles contains 1350 milligrams of sodium. This means that one packet of instant noodles already contributes 3.5 grams/day of salt or (67.5%) of the daily recommendation.

This study is in line with Marendra and Alenxander's research that there is a statistically significant relationship between salt intake in fast food and the incidence of obesity in students of SMP X Yogyakarta (p=0.021), it was found that adolescents at SMP X Yogyakarta who had overweight and obese status respectively (9.8% and 8.2%), obese adolescents consumed sodium intake> 2300mg / day as much as (1.6%) in this study it happened because the school has a location in the city center where there are many fast food restaurants such as McDonalds, KFC, Pizza Hut and others (Kartolo, M. S. and Santoso, A. H (2022).

Increased salt consumption increases fluid retention. Therefore, salt can increase body mass index because there is an accumulation of intracellular fluid and stimulates hunger and thirst. This hunger can increase the frequency of consumption of children and cause excess calories to be stored in adipocytes (Rafie, et al 2018). According to research by Ma, He and MacGregor (2015) in Sabrina (2019) also showed that an additional 1 gram of salt intake per day was associated with an increased risk of overweight or obesity by 28% in children and by 26% in adults.

This study states that many respondents consume excess fat because the types of food sold in canteens and school environments are mostly foods that go through the frying process in the form of cilor, bakwan fritters, and in the form of fast food such as burgers, instant noodles and others. From instant noodles alone, the fat content is 12 grams that can be consumed almost every day and most respondents often eat light snacks which are almost all with food through the frying process, in just one fried food, for example, 50 grams of bakwan already contains 6 grams of fat, 1 exchanger, instant noodles contain 23.53 grams of fat. Packaged drinks also contain quite a lot of fat, for example, 25 grams of milo contains 12 grams of fat. This study is in line with the research of Rahmita, Maria and Aulia (2021)

there is a significant relationship between fat intake and the incidence of overnutrition in high school students ($p<0.05$), it is found that students with overnutrition status aged 16-18 years (26.1%) and it is known that the average fat intake consumed by Padang City Development High School students is on average 57, 7 gr (22.2 gr-108.1gr) when viewed from the SQ-FFQ results, it is known that high-fat food ingredients that are often consumed by overnourished students are fried snacks such as fried tempeh, tofu and chocolate (Rahmita, et al, 2021). In this study, it can be concluded that fat intake which is the cause of the incidence of overnutrition in adolescents is not only from food cooked at home but comes from snacks. Epidemiological studies show that overweight is a problem that arises from excessive fat intake due to the accumulation of fat in adipose tissue (Kamulasari, 2016).

The results of this study state that most respondents consume fiber in the low category because the types of food sold in the canteen and school environment are mostly snack foods high in sugar, salt and fat very rarely snack foods that contain high fiber. Fiber obtained from snack foods is only a little from foods such as ketoprak, gado-gado, burgers and fried foods. And rarely do students use vegetables if they buy snacks that have vegetables in them. For example, in vegetable hodgepodge only 8 grams in 1 serving and in bread only contains 4.8 grams of fiber The rest is from other food ingredients that contain fiber. This study is in line with Rahmad's research (2018) which found that the proportion of elementary school children who were obese 61.8% had low fiber intake and those with sufficient fiber intake were 38.2%. Obtained p value = 0.015 and OR value = 3.9, indicating that there is a significant relationship between fiber intake and the incidence of obesity. Where low fiber intake is at risk of 3.9 times being obese compared to SDN 20 banda aceh children whose fiber intake is sufficient (Rahmad, 2018). Dietary fiber is beneficial to the body because it delays hunger by slowing down the emptying of the stomach. This makes one less hungry and slows down digestion, as carbohydrates and fats stay in the stomach for a long time and the digestion process in the small intestine slows down. So there is no accumulation of fat in the body. This is useful for preventing overeating or obesity (Rachmi, et al, 2018).

4 CONCLUSIONS

Based on the results, showed that most respondents were overweight and obese (41.7%), more sugar consumption (62.5%), more salt consumption (59.7%), adequate fat consumption (61.1%), and low fiber consumption (84.7%). The results of the Chi-square test showed that there was a relationship between sugar consumption ($p=0.000$), salt consumption ($p=0.000$), fat consumption ($p=0.000$) and fiber consumption ($p=0.022$) with nutritional status in students of SMA Taman Harapan 1 Bekasi City. That adolescent who consume high sugar, salt, fat and low fiber tend to be obese.

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EMPOWERING MEN IN FAMILY PLANNING DECISION-MAKING: ANALYTICAL STUDY OF MEN AS FP ACCEPTORS IN DUREN JAYA AREA)

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Abstract: The family planning program was proclaimed to protect reproductive rights and universal human rights, but it is implementation was not appropriate. Family planning programs tend to focus on women as the main target. This study aims to identify factors related to male participation as family planning acceptors. This type of research is qualitative using phenomenological studies. The population used was all male family planning acceptors in Duren Jaya sub-district who used condoms or vasectomy, 83 of whom used condoms and 7 vasectomies. The sampling technique in selecting informants used non-probability sampling with the snowball sampling method. The sample size used was 3 key informants, 3 supporting informants, and 2 key informants. The results of the study stated that internal factors (knowledge, perception, wife's health, and wife's support) had an influence on men's participation as family planning acceptors.The results of this study show that internal factors influence men to contribute as birth control acceptors. These findings suggest conducting similar research by adding socio-cultural and religious value variables, so as to harmonize from a broader aspect and increase public attention so that family planning programs can be accepted and eliminate negative stigma.

1 INTRODUCTION

Indonesia is one of the countries with the highest population density, ranking 4th in the world. According to the Indonesian Central Statistics Agency, the 2021 population census reported a populating of 273 million people, indicating a significant increase in population density. The impact of the population explosion on the quality of life includes issues such as poverty, hunger, malnutrition in children under five, maternal and child mortality, and increased unemployment. Additionally, it has led to environmental and ecological consequences, including deforestation, soil and sea erosion, coastal abrasion floods, landslides, and land drought. Furthermore, the rapid population growth has made the benefits of development less accessible to the community.

Therefore, direct efforts to reduce birth rates are carried out through family planning programs aimed at Couples of Reproductive Age (PUS). Family planning, as defined Law No. 10 of 1992 concerning population development and the development of a prosperous family, is an effort to increase awareness and community participation through the maturing of the age of marriage (PUP), birth control, fostering family resilience, and enhancing the welfare of small, happy and prosperous families. Meanwhile, according to the World Health Organization (WHO) expert committee in 1997: *family planning is an action that helps married couples to avoid unwanted pregnancies, get births that are very desirable, regulate the interval between pregnancies, control the time of birth in relation to the husband's age wife and determine the number of children in the family.*

Family planning is one of the efforts to achieve family welfare and serves as an action that assists married couples in achieving pregnancy spacing (Matahari, Utami, & Sugiharti, 2019). Moreover this program forms the foundation for the implementation of government policies in the population sector, which have implications for both quantitative and qualitative development. Therefore, the placement of

the family planning program holds a strategic position in regulating the rate of population growth (Kusumawardani & Azizah, 2021). Meanwhile, family planning aims not only to enhance the welfare of mothers and children but also to foster happiness and prosperity within small families. The family planning program targets two primary groups. The first group comprises couples of childbearing age who can reduce birth rates through consistent contraceptive use. The second group includes family planning implementers and managers who, through an integrated population policy approach, aim to create quality and prosperous families.

The International Conference on Population and Development (ICPD) in Cairo in 1944 declared that the family planning program holds a strong commitment to empower women. It emphasized that population development and the advancement of prosperous families should be grounded in the principles of justice and gender equality (Nadyah & Afiif, 2020). Consequently, this shift in the paradigm of population and development led to a change in the orientation of the family planning program, moving from a demographic focus to a reproductive health focus. The transformation of the family planning program in the new era necessitates reorienting and repositioning the program in a comprehensive and integrated manner. This reorientation was articulated to ensure the provision of high-quality family planning and reproductive health services, as well as to uphold and safeguard reproductive rights, which are integral and universal human rights (Raidanti, Wahidin, & Rahayu, 2021).

However, the implementation is not as it should be. The program tends to primarily target women, even though family planning programs should be a shared responsibility. Men's participation is a form of cooperative involvement in family planning and reproductive health, promoting healthy and safe sexual behaviour for themselves, their partners, and their families. Gender equality and justice have not been optimally realized due to the strong influence of patriarchal socio-cultural values. While the family planning program has succeeded in curbing the population explosion, it has not effectively improved the health and welfare of women. One piece of evidence is the high maternal mortality rate in Indonesia, which is even recognized as the highest among Southeast Asian countries (Bunyamin, 2014).

The use of contraceptives has increased over the years. In 2002 it was 60.3%, in 2007 it was 61.4%, in 2012 it was 61,9%, and in 2019, it had reached 62.5%. However, contraceptive usage in Indonesia is still predominantly women-driven. This was reinforced in 2019 when female family planning methods were utilized by 98.3% of the population, whereas male family planning methods were used by only 2.2%. according to Indonesia's health profile for 2020, the coverage of active condom and vasectomy participants remained significantly low, with percentages of 1.1% for condoms and 0.6% for vasectomy.

For the West Java province, the total number of active acceptors amounted to 466,304 people, with a breakdown of 35,144 using condoms and 31 undergoing vasectomies. Bekasi City, located in the province of West Java, reported low percentages for condom usage, which stood at 3% for couples of childbearing age, and vasectomy usage was at 1%, according to the health profile of Bekasi City in 2020.

2 SUBJECTS AND METHODS

The focus of this research aims to determine the predisposing, enabling, and reinforcing factors that influence men's participation as family planning acceptors in Duren Jaya area. This type of research is qualitative with a phenomenological design. Data processing in this research includes data reduction, data display and conclusions or verification and validation used is source triangulation. Data was collected through a survey using an interview guide with the help of a voice recording device. The population in this study encompassed all male family planning acceptors in Duren Jaya sub-district. The sample for this study was selected using a non-probability sampling technique, specifically the snowball sampling method, comprising 3 main informants. Main informants are individuals serving as sources of information both physiologically and psychologically within the scope of this study, and they were selected from respondents who are family planning participants recorded at Duren Jaya Health Center. In addition, 3 supporting informants, representing the family's perspective, namely the wives of the family planning participants, were included. Furthermore, 2 key informants, individuals playing pivotal roles in the data collection and validation process, were also chosen. In this study, the key informants were the head of the family planning program (DPPKB) and the midwives of the Duren Jaya Health Center.

3. RESULT

3.1 Family planning acceptors

Regarding male birth control acceptors, the situation at the Duren Jaya Health Center is relatively small, it is based on a statement made by the person in charge of the family planning program at the UPTD Duren Jaya Health Center. In addition, the type of contraception used by the main informant, most of them used non-hormonal contraceptive methods, namely condoms, but one informant used the vasectomy method. Based on information from DPPKB that the condition of male family planning in Bekasi on a national scale, that Bekasi City has a fairly good condition. This is based on the characteristics of the population who have a good level of education so that they understand and understand male birth control.

In-depth interviews were conducted with 2 key informants (LA and R) and main informants (MZY, SA, and AK).

Table 1: Results of in-depth interviews regarding Family Planning acceptors.

Family planning acceptors	Type of informant		
The level of participation in the family planning program at Duren Jaya health center	Key informant		
	"very few"		
Type of contraception used	Main informant		
	MZY	SA	AK
	"vasectomy"	"condom"	"condom"
The condition of male family planning in Bekasi on a national scale	Key informant		
	"… is good enough"		

3.1 Knowledge

Knowledge is a factor that influences informants in their participation as birth control acceptors, knowledge includes the definition of contraception, birth control acceptors, and the advantages and disadvantages of contraceptives used. Based on the results of interviews with the main informants, it was concluded that the three informants already understood about contraception, birth control acceptors, as well as the advantages and disadvantages of contraceptives used.

In-depth interviews were conducted with main informants (MZY, SA, and AK).

Table 2: Results of in-depth interviews regarding Knowledge.

Definition of contraception	Main informants		
	MZY	SA	AK
	"...Spacing out pregnancies"	"…Preventing pregnancy"	"…Sex safety"
Definition of FP acceptor	"…People who use contraceptives"	"…Users of condoms or other contraceptives"	"…Do not know yet"
Advantages related to contraception used	"…Accurate, long-term scale"	"…Easy to use, easy purchase access, affordable price"	"..No effect into the body, easy to use, easy to find and available everywhere"
Disadvantages related to contraception used	"..The price is expensive, feeling the pain"	"...Feeling worried about leakage and the possibility of allergies in the genitals"	"… Not pleasing during sexual intercourse"

3.2 Perception

Perception is the process of interpreting information inputs to create a meaningful picture of the whole. Based on the interview, the informant gave a positive view of the birth control acceptor. They explained that being an acceptor of family planning is a shared responsibility, not focused on women, besides that the decision to become an acceptor is formulated jointly and familially.

In-depth interviews were conducted with 2 key informants (LA and R) and main informants (MZY, SA, and AK).

Table 3: Results of in-depth interviews regarding Perception.

Perceptions regarding male FP acceptors	Main informants		
	MZY	SA	AK
	"..Responsibility between husband and wife"	"…Responsibility between husband and wife"	"…Responsibility between husband and wife"
Reason to be an acceptor	"…The wife feels reluctant to be the acceptor"	"…Own initiative"	
Opinions regarding FP are only intended for women	"…Disagree"	"…Disagree"	"… Disagree"
Men's perceptions of FP program carried out by health facilities	Key informant		
	" … so far they agree with the FP program"		

3.3 Economy

According to DPPKB, the economy is a factor for men to participate in becoming family planning acceptors, it is because the needs of life are increasing. That way the participation of men to become acceptors of family planning is expected to stabilize the family economy.

In-depth interviews were conducted with key informants (R) and support informants (AA, PV, and HR).

Table 4: Results of in-depth interviews regarding Economy.

An overview of the perceptions of men who want to have FP in Bekasi City	Key informant		
	"…Increasing economic and lifestyle needs, such as education and living necessities"		
Mother's reaction when spending funds for male participation in FP	Support informants		
	AA	PV	HR
	"..Agreed"	"…Agreed"	"…Agreed"

3.4 Wife's health

Not only economic needs, DPPKB also explained that men's concerns about their wives' health, especially reproductive health, are perceptions of men's supporters for birth control.

In-depth interviews were conducted with key informants (R) and main informants (AK).

Table 5: Results of in-depth interviews regarding Wife's health.

An overview of the perceptions of men who want to have FP in Bekasi City	Key informant
	"…Birth spacing that is too close will be fraught with health risks"
	Main informant

Reason to be an acceptor	"… Female birth control spirals or inserts in organs are dangerous"

3.5 Population density

Based on the statement of DPPKB, that population density is one of the factors for men participating in becoming family planning acceptors, it aims to suppress the rate of population growth in Bekasi City.

In-depth interviews were conducted with key informants (R) and main informants (AK).

Table 6: Results of in-depth interviews regarding Population density.

	Key informant
An overview of the perceptions of men who want to have FP in Bekasi City	"…Suppressing population growth rate in Bekasi City"
What are the problems with male FP (condoms/vasectomy) in every health center in Bekasi	"… Depending on the population in an area, the denser the population in an area, the more male FP acceptors"

3.6 Environment

In relation to the societal stigma associated with men participating in birth control programs, the three respondents succinctly stated that they had never encountered any negative community stigma. Consequently, there was no intervention that influenced their decision to become birth control acceptors.

In-depth interviews were conducted with 2 key informants (R) and main informants (MZY, SA, and AK).

Table 7: Results of in-depth interviews regarding the Environment.

	Main informants		
Ever heard of society's stigma against men who do FP programs?	MZY	SA	AK
	"…Never"	"…Never"	"…Never"
DPPKB officer's response to the constraints of male FP from the negative stigma in society regarding male FP	Key informant (R)		
	"…Continue to provide education, even though the community still lacks understanding and is still taboo about male FP programs"		
Are there other forms of programs that support men's participation in FP?	"…Forming male FP associations or organizations at the neighborhood unit, community unit, or sub-district level"		
Is there any form of collaboration in order to increase male FP acceptors with other stakeholders in Bekasi City?	"…Collaborate with various sectors to educate or invite both women and men to FP"		

3.7 Wife's support

Based on the results of interviews with wives of male birth control acceptors, it was found that most wives do not share information regarding male birth control methods, such as condoms or vasectomy. However, one of them does provide information through casual discussions, which include both male and female birth control methods. As a result, the researchers concluded that there is a lack of informational support for male birth control.

In-depth interviews were conducted with support informants (AA, PV, and HR).

Table 8: Results of in-depth interviews regarding Wife's support.

	Support informants		
	AA	PV	HR
Did you provide information about male birth control (condoms/vasectomy)	"…Provide information"	"…Does not provide information"	"…Does not provide information"
Did you provide advice in helping to make decisions regarding participation in FP	"…Not giving advice"	"…Not giving advice"	"… Not giving advice"
Did you motivate your husband to participate in FP? If so, what kind of motivation	"…Provide an understanding that the stigma that exists in society is not necessarily true"	"…Provide the necessary motivation"	"…Giving in the form of an understanding that if the husband becomes the acceptor it will have a good impact on the health of his wife"

3.8 Quality of healthcare

The quality of health services assesses whether family planning services at the Duren Jaya Health Center are adequate. This assessment is based on interviews conducted with the three main informants, revealing that the Duren Jaya Health Center is considered incompetent in fulfilling various aspects of family planning services.

In-depth interviews were conducted with main informants (MZY, SA, and AK), key informants (R and LA), and support informants (AA, PV, and HR).

Table 9: Results of in-depth interviews regarding Wife's support.

	Main informants		
	MZY	SA	AK
Are male FP services close to your home?	"…It is quite far away"	"…It is quite far away"	"…It is quite far away"
Does DPPKB conduct counseling activities related to the use of male FP	Key informant (R)		
	"…Yes, through mini-workshop activities counseling can be done directly or privately"		
Does Duren Jaya health center conduct outreach regarding FP acceptors?	Key informant (LA)		
	"…Yes, targeting women is carried out at Posyandu, and mini-workshops"		
Is socialization related to FP acceptors also carried out for men?	"…Never in a wide scope, only per case if the wife experiences contradictions, the Health care advises the husband to join family planning"		
Does Duren Jaya health center provide a variety of FP contraceptive options?	"…Yes, condoms and vasectomy. The condoms were given free of charge and the vasectomy was carried out in collaboration with Karangkitri health center"		
Regarding condoms, how is the	"…In collaboration with clinics, then external parties record everyone who wants to take birth control, and this		

flow of distribution of condoms	data is documented for future use as a benchmark for condom needs in the following month"		
Have you ever been offered various choices of contraceptive methods from health facilities	Main informants		
	MZY	SA	AK
	"…Never"	"…Never"	"…Never"
Did you get information about the benefits and side effects of various methods of contraception?	"…Just getting in the hospital"	"…Never"	"…Never"
Did you get an explanation of the procedure for every action that the FP officer will take?	MZY	SA	AK
	"…Yes, get"	"…Never"	"…Never"
Did you get information from the FP officer on when to control or make a repeat visit?	"…Yes, get"	"…Never"	"…Never"
Does Duren Jaya health center provide a control schedule or repeat visit	Key informant (LA)		
	"…There are not any yet"		
Are you satisfied with the various services provided by the FP program	MZY	SA	AK
	"…Not satisfied"	"…Not satisfied"	"…Not satisfied"
Do you encourage your husband to get involved in counselling about FP if it is done by a health facility (condom/vasectomy)	Support informants		
	AA	PV	HR
	"…Yes, support"	"…Yes, support"	"…Yes, support"
What are the inhibiting factors for someone in making a decision to have FP insofar as you socialize the male FP program in Bekasi City	Key informant (R)		
	"…Weekdays, because the majority of the population of Bekasi City are workers"		

4. DISCUSSION

4.1 Family Planning Acceptors

Based on interview results, most of the contraceptive methods used among the three informants were condoms, while a few others opted for vasectomy. Through in-depth interviews with DPPKB, 82 men were found to be using condoms, and 7 men had undergone vasectomy. However, when it comes to the level of male participation in the family planning program, very few were recorded at Duren Jaya Health Center. This discrepancy can be attributed to the fact that data collection for male family planning acceptors at DPPKB was carried out concurrently with family data collection. In contrast, the data obtained by the Duren Jaya Health Center's UPTD was adjusted according to the number of men who visited for counselling related to family planning. On a national scale, DPPKB also reported that male participation in the family planning program in Bekasi was relatively good.

4.2 Knowledge

The results illustrate that the informants have good knowledge. According to (Pasrah, Putro, & Indrawati, 2014) contraception is a tool to minimize the occurrence of fertilization of sperm cells with egg

cells or prevent unwanted pregnancies, thus informants are assessed to understand the meaning of contraception. Even though they understood the meaning of contraception, there was one informant who did not know the meaning of family planning acceptors. The definition of an acceptor is an individual who contributes to the FP program by using contraceptives (Cristiana, Harlen, & Widayatsari, 2021). In addition, the informants were able to explain the advantages and disadvantages of each contraceptive used, therefore the result of the study indicated that the knowledge and understanding of the main informants was considered good.

The results of this study are supported by previous research conducted by (Adam, Mandang, & Purwandari, 2012) that found a significant relationship between knowledge and male participation as FP acceptors. This finding is also in line with research conducted by (Kamal, Islam, Alam, & Hassan, 2013), which shows a significant relationship between knowledge and male participation in FP. Other similar research conducted by (Dwintasari & Mulyawan, 2017) states that there is a relationship between knowledge and the role of men as FP acceptors, these findings are reinforced by the research of (Tisnilawati, 2017), which also found a relationship between knowledge and the contribution of men in FP programs.

4.3 Perception

Based on the results of in-depth interviews, the three main informants had a positive view of FP acceptors. They explained that being a FP acceptor was a shared responsibility. Additionally, the three informants expressed their disagreement regarding whether the FP program was intended solely for women. These results are in line with the research (Rizkitama & Indrawati, 2015), which indicates a relationship between perceptions and men's involvement in FP programs. Other studies that also support these findings are (Dewi & Rahmawati, 2019), which state that there is a significant relationship between perception and male participation in FP.

Researchers agree that a person's perceptions can be one of the factors influencing their decision to become an FP acceptor. This was evident from the responses of the main informants, who tended to respond positively to questions about the perceptions of acceptors. This finding aligns with Inwanto (2002:71) in (Yussista, Suhartono, Soewardhini, & Kirana, 2022), who suggest that positive perceptions are indicative of knowledge and response, followed by efforts to use that knowledge. A positive attitude is essential for increasing men's participation in FP programs. The use of contraceptives reflects a person's attitude based on a positive assessment (Noor, Putri, & Fakhriyah, 2023). Through interviews with informants regarding the reasons for participating in FP, it was found that some did so because their wives initiated it. Based on research by (Fatimah, 2016), a positive attitude is related to men's participation in FP.

4.4 Economy

Based on the result of in-depth interviews with key informants, namely DPPKB, men's enthusiasm for FP can be attributed to their perception of increasing economic and lifestyle needs. This includes the rising costs of education, healthcare, and daily living expenses. As is well-known, parents naturally want to provide the beset for their children. Therefore, to build a quality family, it is essential to maintain economic stability within the household. This is further reinforced by the fact that the average income of Bekasi residents falls within the lower-middle-class range. The impact of FP on children has a profoundly positive influence. Families participating in the FP program often ensure that their children receive a higher level of education. This is due to their focused financial resources, which are directed toward a smaller number of children, typically one or two (Soleha, 2016). This research aligns with the findings of (Sari, Febriani, & Farich, 2023), which indicate a relationship between the economy and men's participation in using FP.

On the other hand, the wife's reaction when her husband spends funds to participate as an FP acceptor is an indicator of the fulfillment of the instrumental support function. In this regard, the three informants unanimously agreed and had no objections. For wives whose husbands use condoms, the prices tend to be affordable, so they do not impose a significant financial burden. In the case of husbands who opt for vasectomy, their wives appreciate that this method represents a type of long-term contraception, eliminating future expenses. All three main informants received instrumental support from their wives.

4.5 Wife's health

Based on the results of the study, one of the informants explained that his decision to participate in family planning was influenced by a family experience. He mentioned that the use of female spiral contraceptives had resulted in a uterine

infection, and as a result, he decided that his wife did not need to use family planning methods. Furthermore, DPPKB also emphasizes the use of male family planning as a recommended option to reduce health risks for wives, especially in cases of closely spaced pregnancies.

Closely spaced pregnancies pose a significantly higher risk of malnutrition, particularly for mothers who are breastfeeding. This is because the mother's nutritional resources may decrease, leading to fetal malnutrition. Another concern is that the mother has limited time to recover her uterine condition, which can affect her overall health and often leads to growth and development disorders in children because they are weaned from breast milk prematurely (Safitri, 2016).

4.6 Population density

DPPKB stated that men's perception of joining the FP program is driven by the goal of reducing the population growth rate in Bekasi City. According to (Tiffani, Mayasari, & Rifai, 2020), the FP program is one of the government's efforts to control population growth. The implementation of the FP program aims to limit the number of children born and delay the age of marriage to decrease the high birth rate (Soleha, 2016). Additionally, DPPKB also mentioned that the realization of the FP program varies in each Health Center, depending on the population density in the area. Higher population density tends to increase the number of male FP acceptors.

4.7 Environment

Several studies suggest that the environment has a relationship with men's participation in FP. (Budisantoso, 2009) states that feeling ashamed of the environment when men contribute to being acceptors because there are still those who think that FP matters are women. Including the stigma that has developed in society, namely that FP programs are only intended for women. However, it was different from the results of the interviews where the informants had never heard of this stigma. Even they think that the FP program is the realm of privacy. Thus, the environment is not a factor of participation for them. This is in line with research (Dral, Tolani, Smet, & Luijn, 2018) that talks about FP programs are considered too sensitive or some of them believe that it is a personal or privacy matter.

Through DPPKB's statement, they considered that there were still many husbands who were reluctant to join the FP program because male FP was still taboo in the environment. According to the results of a review of this stigma on news portals (Shanti, 2022) the low interest in FP programs is due to the strong community stigma regarding the use of FP which is focused on women only. According to DPPKN, another form of program to support men's participation in FP is to form associations or organizations at the neighborhood unit, community unit, and sub-district level. In addition to increasing the number of male FP acceptors in the surrounding environment, members of the association or organization can become motivators to share their experiences. DPPKB also stated that it needed strengthening through collaboration with stakeholders from various sectors by conducting socialization activities, approaching, and educating, or inviting both women and men to FP.

4.8 Wife's support

The wife's support is an indicator for someone in deciding to become a FP acceptor. With regard to informational support from wives, there were wives of male FP acceptors who stated that they did not provide information about male FP. acceptors obtain FP information independently. However, there are also wives who share FP information through discussions with their husbands. In addition, the three supporting informants admitted that they did not provide advice in helping to make decisions related to husband participation in FP, although there was one informant who stated that the informant explained the advantages and disadvantages of each type of contraception, henceforth the informant let the husband choose the suitable contraception. In addition to providing information, support can also be shown through motivation. Based on the results of in-depth interviews conducted, motivation was given by the wife to acceptors in the form of positive affirmation sentences, so that the husband was enthusiastic and confident in his decision.

Based on the results of this study, it is also in line with research (Tisnilawati, 2017) which states that wives' support for men's participation in FP programs has a significant relationship, other consistent research conducted by (Dwintasari & Mulyawan, 2017) states that there is a significant relationship between wife's support with men's participation as FP acceptors. Referring to research (Puspita, 2019) suggests that support will be created if individuals understand each other so that good cooperation is established, besides that, the wife's support is very meaningful for making decisions both morally and materially because the wife is the closest

person to the husband. In this case, most of the supporting informants provided moral and material support, such as informational and emotional

4.9 Quality of Healthcare

In this study, it was stated that the three informants had limitations in accessing FP services for men, namely Duren Jaya Health Center. But one of the informants admitted that it was easier to access FP services at the nearest hospital. Meanwhile with regard to counselling, based on the results of interviews with FP acceptors, the three stated that they were not satisfied with the service at Duren Jaya Health Center. This was because the three informants stated that they did not receive information regarding the choice of contraceptive methods, the benefits and side effects of various types of contraception, the procedures for each action, and information regarding control schedules or repeat visits. This statement was reinforced by the person in charge of the FP program at the Duren Jaya Health Center who stated that socialization regarding FP acceptors was only carried out to target women of childbearing age with a wide scope. Meanwhile, for male targets, it is only carried out during counselling. Even that is not massive, in the sense that socialization is only carried out if the wife has contraindications, so it is not recommended to join the FP program. This is different from DPPKB, whose counselling is carried out through mini-workshops or seminars.

Another problem related to the provision of contraceptive options for FP, Duren Jaya Health Center actually provided condoms and vasectomy contraceptives. Regarding condom contraception, DPPKB has collaborated with Health Centers in each village, condom contraception will be distributed free of charge according to data obtained from health clinics or hospitals. Meanwhile, in the vasectomy flow, Duren Jaya Health Center is collaborating with Karangkitri Health Center, for later follow-up will be carried out at Bantargebang Hospital. However, the main informant admitted that he did not feel that there would be any offers regarding various choices of contraceptive methods from health facilities, be it condoms or vasectomy. Not only that, they also conveyed that information about the benefits and side effects of each contraceptive method was also not conveyed, so far they gathered their own information from various sources, especially regarding the procedure for use.

The main informants who used condoms so far understood the process of using these contraceptives, in contrast to the use of vasectomy who needed complete information about each process. Luckily, when one of the main informants chose vasectomy as the right method, the FP officer gave an explanation of the vasectomy procedure and stated that it would take approximately 10 to 15 minutes, along with information regarding repeat visits to carry out checks regarding the accuracy of the method, the informant admitted that repeat visits were held every 2 or 3 months. However, based on a statement from Duren Jaya Health Center so far no repeat visit services have been held because the participation rate of FP is small and does not have specific data regarding acceptors' names, addresses, and the type of contraceptive used. Therefore, the community Health Center considers that this facility is not really needed at this time. In this regard, one of the informants who used vasectomy chose hospital services as an alternative.

Thus the quality of health services is not seen as a factor for men as FP acceptors. According to (Arifin, Sutomo, & Wahyudi, 2018) quality and satisfactory services need to be carried out to increase community participation in their participation as acceptors in the FP program. Id the service satisfies the community, this can increase and also maintain men's participation in the FP program. In this regard, reinforced by the statements of supporting informants regarding support for social integration, in which a wife is able to mobilize men's participation in the FP program, the researcher makes outreach activities about FP as one of her programs. Referring to this, the three informants simultaneously agreed if the husband was involved in extension activities. However, it is very unfortunate that the health facilities in his environment have so far not held counseling regarding the male FP program, moreover, it is implementation is only aimed at women. Based on the research results, this is in line with (Maryana, 2021) that there is no relationship between access to health service facilities and men's participation in FP.

The strength of this research is the selection of key informants who come from the local community Health Center (Duren Jaya Health Center) and the Department of Population Control and Family Planning (DPPKB). This approach ensures consistency in the interview results and enables accurate interpretation. Meanwhile, the drawback is that in-depth interviews were not conducted face to face, which meant that the facial expressions of the main and supporting informants were not visible. As a result, the accuracy of the interview results could not be precisely determined.

5. CONCLUSIONS

In conclusion, the factors that influence men's participation as Family Planning acceptors are internal factors, which consist of knowledge, perception, wife's health, and wife's support.

It is recommended that future researchers conduct similar research while incorporating variables related to socio-cultural and religious values. This approach will enable men's family planning programs to align with these aspects and enhance public awareness, ultimately leading to greater acceptance and the elimination of negative stigmas associated with family planning programs

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FACTORS AFFECTING BLOOD PRESSURE OF YOUNG ADULTS AGED 20-30 PERUM PERURI TANGERANG CITY IN 2022

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Keywords: Blood pressure, Influencing factors, Young adult age

Abstract: Hypertension is one type of non-communicable disease with an increasing number of events every year. The prevalence of blood pressure every year has increased, according to Riskesdas on a national scale in 2007 31.7%, in 2013 25.8%, and in 2018 34.11%. The purpose of the study conducted in 2022 at the Perum Peruri was to determine the factors affecting the blood pressure of young adults aged 20-30 years. This research with a quantitative approach with Cross Sectional studies, sampling techniques in this study using Non Probability Sampling, namely Purposive Sampling with the Slovin formula obtained a sample of 93 respondents. Gender variables, family history, smoking habits, coffee consumption using questionnaires. Body Mass Index takes measurements with microtoice and weight scales. Physical activity variables using the Global physical activity questionnaire (GPAQ), and stress levels with the statement Depression Anxiety Stress Scales (DASS). Data analysis using the Chi-Square test and the results showed that the variables gender (p-value = 0.001), family history (p-value = 0.004), smoking habits (p-value = 0.018), coffee consumption (p-value = 0.020), physical activity (p-value = 0.000), stress level (p-value = 0.038) had a significant relationship with blood pressure. The variable body mass index (p-value = 0.127) was not significantly associated with blood pressure. Based on the results obtained, it is necessary to supervise both family and environment can be aware of each other's factors affecting blood pressure in young adults.

1 INTRODUCTION

Indonesia hypertension is a major issue. High blood pressure is a condition that is regularly observed in medical institutions no longer dominated by the elderly, it now affects persons under the age of 50. According to the 2007 Riskesdas study, 18-year-olds accounted for 31.7% of national blood pressure, 18-24-year-olds 12.2%, and 25-34-year-olds 19%. Males account for 31.3% of the population, while females account for 31.9% (Departmen Kesehatan RI, 2008). Age 18-24 years declined by 25.8% in 2013, ages 25-34 years decreased by 8.7%, and ages 25-34 years decreased by 14.7% (Kementerian Kesehatan RI, 2013). In 2018, the ages 18-24 years increased by 34.1%, while the ages 25-34 years increased by 13.22%. Males make up 31,34% of the population, while females make up 36,85% (Riskesdas, 2019).

According to data from Banten province, the prevalence of hypertension in 2007 age of 18 years 27,6%, age 15-24 years 9,5%, age 25-34 years 17,7%. In the males 26,2% below the incidence of hypertension in females 28,9%. Tangerang City 23,2% (Departemen Kesehatan RI, 2009). In 2013 23,2%, age 15-24 years 7,2%, age 25-34 years 15,8%. The male gender is 19,7% below the incidence of female hypertension 24,6%. Tangerang City 24,5% (Sri Irianti, 2013). In 2018 age ≥ 18 years 29,47%, age 18-24 years 12,60%, age 25-34 years 17,56% Tangerang City 30,10% (Riskesdas, 2019).

Young adults the transition from adolescence to adulthood, in the age range is 20-30 years. In terms of Economic Freedom, time is own front (Monks, *et al.*, 2001 In Putri, 2019). Increased pressure blood in young adults due to culture has adverse effects on the body such as alcohol consumption, overweight, lack of exercise 2 physical activity, smoking. Other factors such as family history, age, and gender (Soenarta, *et al.*, 2015 in Utama, 2021).

Male unhealthy lifestyle has the effect of 1,75 fold increaserease affected by high blood pressure (Amanda & Martini, 2018). Blood pressure is high found many males when compared to females before

menopause (Falah, 2019). However, the research results received different respondents female do not experience higher and lower blood pressure male respondents are more workable (Sartik, *et al.*, 2017). Those with a family history of high blood pressure are at risk 2 times with parents with high blood pressure (Krisnawati & Eulis, 2018). The risk of developing high blood pressure in the offspring increases if family members have a history of the disease (Nugroho, *et al.*, 2019). Different research results found that the majority did not have a family history of high blood pressure (Nadir, 2019).

Young adults with an obese body mass index have 3 times greater blood pressure (Yulia & Nuzula, 2019). Blood fat levels rise with age, causing narrowing of blood arteries (Aquarista & Hadi, 2017). This may be different if people with more normal body mass indices are not at risk of having high blood pressure (Ansar & Dwinata, 2019).

Smoking with nicotine levels has a 15-fold risk of high blood pressure (Sriani *et al.*, 2016). The result is narrowed blood vessels and the working mechanism of the heart is harder (Susiani *et al.*, 2019). Different research findings state that smokers use filters and engage in physical exercise (Fadhli, 2018).

Coffee can raise blood pressure due to its caffeine content (Fatmawati *et al.*, 2017). Furthermore, it has been reported that consuming one to two cups of coffee every day raises blood pressure by four times (Nugraheni & Wijayanti, 2018). But, other research indicates that the majority of people do not drink coffee for health-related reasons, which means their blood pressure does not rise (Mullo *et al.*, 2018).

In comparison to moderate or intense physical exercise, those who engaged in inactive physical activity saw a two-fold increase in blood pressure (Rihiantoro & Widodo, 2017). Because blood pressure overflowed with higher arterial walls, raising peripheral blood pressure, higher heart rate frequencies were shown to be passive exercise (Cristanto *et al.*, 2021). According to the study's findings, most levels of vigorous physical activity can help lower the risk of high blood pressure (Rachmawati, 2013).

If there is a threat, the pituitary brain gland releases endocrine gland hormones into the blood, which triggers the hormone adrenaline and raises blood pressure (Rahmadhani, 2021). Risk of 3 times increase in blood pressure (Subrata & Wulandari, 2020). However, findings show that the majority of people have normal blood pressure and low stress levels (Arum, 2019).

According to a preliminary survey in November 2021 with 10 individuals aged 20-30 years. The results showed that 2 out of 10 people who took blood pressure measurements had high blood pressure, 4 out of 10 people had a family history of hypertension, and 3 out of 10 people who smoked actively every day could smoke 8–16 cigarettes, in body mass index conditions 6 out of 10 people had normal, 1 in 10 people were overweight, 2 in 10 people are obese, and 1 in 10 people are underweight. 10 people, 6 did physical activity twice a week, and four did physical activity once a week. 2 out of 10 people have hypertension in their family, 6 out of 10 people can drink 2 cups of coffee daily, and 2 out of 10 people can drink 1 cup of coffee daily. 9 out of 10 people experience normal levels of stress, 3 out of 10 people experience moderate levels of stress, and one in ten people experience very severe levels of stress.

Based on the findings of a previous survey conducted by researchers to young adults aged 20-30 years, it was found that the proportion of pre-hypertension is 20%, It is also very likely to occur in young adulthood, especially when a bad lifestyle is carried out with a proportion of hypertension 40%.

Nicotine one of the compounds in cigarettes, can raise blood pressure and heart rate by stimulating the adrenalinergic system (S. Martini & Hendrati, 2006). This notion is reinforced by the fact that 30% of smokers can smoke 8-16 cigarettes per day.

The proportion of thin body mass index is 10%, normal body mass index is 60%, overweight body mass index is 10%, and obesity body mass index is 20%. When compared to a person with normal, an overweight person is 1,97 times more likely to have high blood pressure (Arum, 2019).

Based on physical activity levels, 40% do physical activity twice a week and 60% do physical activity once a week. The blood pressure of active people is usually lower than that of inactive physical activity.

60% of respondents spend two cups of coffee daily, and 20% only spend one cup daily. The blood pressure of people who drink caffeine is higher than that of people who don't.

High blood pressure can increase due to workload, family, and society. 60% of stress levels are normal, 30% of stress levels are moderate, and 10% of stress levels are very severe. Work, economic, and personal characteristics can be sources of this stress.

Aged 20-30 years believe this hypertension sickness to be dangerous. But, they usually regard this disease to be one that only the elderly suffer from. At Perum Peruri Tangerang City, researchers will look at factors that influence blood pressure in young adults aged 20-30.

2 SUBJECT AND METHODS

Research is quantitative research using a cross-sectional research design and Chi-Square statistical test. The population in this study is 1426 people living in Perum Peruri. Samples using non-probability sampling and purposive sampling, which were 93 samples.

This study's inclusion criteria are respondents aged 20-30 years who are willing to be a research sample. Exclusion criteria for this study included individuals disabled, taking hypertension medications, pregnant, and heart disease.

Blood pressure is the dependent variable. Age, gender, family history, body mass index, smoking habits, coffee, physical activity, and stress levels are the independent variables.

SPSS software version 22 was used to analyze the data. Univariate analysis was performed to display the frequency of each variable and bivariate analysis. Using chi-square for relationship analysis of dependent variables and independent variables. Besides, bivariate analysis of the prevalence risk ratio.

2.1 Measures

Researchers conduct screening by visiting homes one by one, according to inclusion and exclusion criteria. The activity lasts 2 weeks, carried out from 9 am on Saturday to Sunday. The study lasted one month, January to February 2023.

The pressure produced by blood circulation on the walls of the body's arteries is measured by the nurse with a Sphygmomanometer. 1. Normal (systolic < 120 and diastolic < 80 mmHg), 2. Pre-hypertension (systolic 120-139 mmHg or diastolic 80-89 mmHg), 3. Grade 1 hypertension (systolic 140-159 mmHg or diastolic 90-99 mmHg), 4. Grade 2 hypertension (systolic ≥ 160 mmHg or diastolic ≥ 100 mmHg) (JNC 7, 2003 in Kurniadi & Nurrahmi, 2018).

Age and gender variables using respondent-filled surveys. Family history variables with two categories: 1. hypertension family and 2. non-hypertension family, are collected by questionnaires in the interview technique.

Body mass index variables measured height using microtose and weight weighed using scales, with measurements made twice. Were measured height using microtoses and weight was weighed using scales, with measurements made twice. Categories 1. Underweight moderate thinness (< 17.0), 2. Underweight mild thinness (17.0-18.4), 3. Normal (18.5-25.0), 4. Overweight (25.1-27.0), 5. Obesity (>27.1) (Menteri Kesehatan Republik Indonesia, 2014).

Smoking habit variables using questionnaires with interview methods, Smoking habit variables using questionnaires with interview method, categories 1. no smoking, 2. light smokers (1-10 cigarettes/day), 3. moderate smokers (11-20 cigarettes/day), 4. heavy smokers (> 20 cigarettes/day) (Departemen Kesehatan Republik Indonesia, 2004 in Sundari *et al.,* 2015).

Variable coffee consumption using questionnaire with interview method, category 1 .No coffee consumption (0 cups/day), 2. Light (1-2 cups/day), and 3. Medium (3-4 cups/day) (Sianturi, 2013 in Martini & Lelyana, 2012).

Physical activity variables using the global physical activity questionnaire (GPAQ) with interview method, categories 1. Low (total Mets < 600), 2. Medium (total Mets ≥ 600-3000), and 3. High (total Mets > 3000) (World Health Organization, 2021).

The stress level variable used the Depression Anxiety and Stress Scale (DASS), containing 21 statements. respondents filled out the statements themselves, categories 1. Normal (score 0-14), 2. Light (score 15-18), 3. Medium (score 19-25), 4. Heavy (score 26-33), and 5. Very heavy (score 34+) (Lovibond & Lovibond, 1995 in Indira, 2016).

3 RESULTS

3.1 Research Site Overview

It took place at Perum Peruri, East Sudimara Village, Ciledug District, Tangerang City, Banten Province. There are 1426 communities, having public facilities such as Badminton Court, Futsal Court, Table Tennis, Park, Coffee Shop, Mosque, Kindergarten, Posyandu, and Fishing Area.

Productivity includes young adults aged 20-30 years doing activities such as work, and college. The frequency of activity makes most young adults rarely engage in regular physical activity. After an activity outside the home, tend to relax, rest, and chat while smoking or drinking coffee at a local shop. Busy and stressful work causes feelings of stress and the appearance of hypertension, inseparable from the fact that cultures that are detrimental to the health of the body can cause high blood pressure.

3.2 Respondents Characteristics

Table 1. Frequency Distribution of Respondents by Characteristic

No	Variables	Amount	Percentage (%)
1	Blood pressure		
	Normal $^{120}/_{80}$ mmHg	42	45,2
	Pre-Hypertension (systolic 120-139 mmHg or diastolic 80-89 mmHg)	40	43
	Hypertension Grade 1 (systolic 140-159 mmHg or diastolic 90-99 mmHg)	9	9,7
	Hypertension Grade 2 (systolic ≥ 160 mmHg or diastolic ≥ 100 mmHg)	2	2,2
2	Age		
	20	15	16,1
	21	7	7,5
	22	14	15,1
	23	13	14
	24	11	11,8
	25	8	8,6
	26	6	6,5
	27	4	4,3
	28	8	8,6
	29	3	3,2
	30	4	4,3
3	Gender		
	Male	47	50,5
	Female	46	49,5
4	Family History		
	Family Hypertension	44	47,3
	Family Not Hypertension	49	52,7
5	Body Mass Index		
	Underweight moderate thinness (< 17.0)	3	3,2
	Underweight mild thinness (17.0-18.4)	10	10,8
	Normal (18.5-25.0)	54	58,1
	Overweight (25.1-27.0)	11	11,8
	Obesity (>27.1)	15	16,1
6	Smoking Habits		
	No smoking (0 cigarettes/day)	48	51,6
	Light smokers (1-10 cigarettes/day)	20	21,5
	Moderate smokers (11-20 cigarettes/day)	23	24,7
	heavy smokers (> 20 cigarettes/day)	2	2,2
7	Coffee Consumption		
	No coffee consumption (0 cups/day)	43	46,2
	Light (1-2 cups/day)	24	25,8
	Medium (3-4 cups/day)	26	28
8	Physical Activity		
	Low (total Mets < 600)	54	58,1
	Medium (total Mets ≥ 600-3000)	32	34,4
	High (total Mets > 3000)	7	7,5
9	Stress Levels		
	Normal (score 0-14)	27	29
	Light (score 15-18)	13	14
	Medium (score 19-25)	41	44,1
	Heavy (score 26-33)	9	9,7
	Very heavy (score 34+)	3	3,2

Based on the table the majority of blood pressure was normal, a total of 42 respondents (45,2%). In determining blood pressure categories, researchers divided into two categories, normal blood pressure and hypertensive blood pressure (pre-hypertensive blood pressure and hypertension 1). As follows

Blood pressure	Amount	Percentage (%)
Hypertension	51	54,8
Normal	42	45,2
Total	93	100

The results show systolic blood pressure categorized as pre-hypertension and blood pressure Diastolic categorized as hypertension 1 or 2, then considered grade 1 or grade 2 hypertension. Diastolic blood pressure is higher than systolic blood pressure and occurs at the age of ≤ 50 years (Nursakinah & Handayani, 2021). Elevated systolic blood pressure usually occurs in older people. The increased pressure on the arteries as the heart contracts is known as a systolic pressure (Gunawan & Lany, 2001).

Based on Table 1, it is known that the average age of respondents is 20 years, which is 16,1%. In addition, by gender, it is known that most respondents are male, which is 50,5%. The family history of most respondents did not have family hypertension, which is 52,7%. Some respondents had hypertension lowered by fathers 18,3% and mothers 29%. Body mass index is known that most respondents fall into the normal category (18,5-25,0), which is 58,1%.

Based on data on smoking habits, respondents are included in the non-smoking category (0 cigarettes/day), which is 51,6%. Of the respondents who smoked, 20,4% smoked with filtered cigarettes, and 28% smoked cigarettes with unfiltered cigarettes. The majority had a habit of smoking every day within 5 years which is 11,8%. Most respondents are included in the category of no coffee consumption (0 cups/day), which is 46,2%. In the type of coffee, respondents chose instant coffee 47,3% with a dose of 20 grams of coffee serving (based on the coffee brand chosen) and pure coffee 9,7% with a dose of 10 grams (depending on household size). With a time of 3-4 years each, which is 15,1%.

The physical activity level of some respondents fell into the low category (total METs < 600) which is 56,1%. In sedentary activities such as sitting either while working, transportation, watching television, or lying down, most spend 1 full day with 360 minutes equivalent to 6 hours, which is 21.5%. The stress level of most respondents falls into the medium-level category (score 26-33), which is 44,1%.

Table 2. Bivariate Analysis of Factors Affecting Blood Pressure in Young Adults Aged 20-30 Years in Perum Peruri, Tangerang City

Variable	Blood Pressure						P-value	OR
	Hypertension		Normal		Total			
	n	%	n	%	n	%		
Gender								
Male	34	72,3	13	27,7	47	100	0,001	4,462
Female	17	37	29	63	46	100		
Family History								
Family Hyper-tension	31	70,5	13	29,5	44	100	0,004	3,458
Family Not Hyper-tension	20	40,8	29	59,2	49	100		
Body Mass Index (BMI)								
Abnormal	25	64,1	14	35,9	39	100	0,127	1,923
Normal	26	48,1	28	51,9	54	100		
Smoking Habits								
Smoking	27	69,2	12	30,8	39	100	0,018	2,813
No smoking	24	44,4	30	55,6	54	100		
Coffee consumption								
Coffee consumption	33	66	17	34	50	100	0,020	2,696
Not coffee consumption	18	41,9	25	58,1	43	100		
Physical Activity								
Inactive	38	70,4	16	29,6	54	100	0,000	4,750
Active	13	33,3	26	66,7	39	100		
Stress levels								
Heavy	34	64,2	19	35,2	53	100	0,038	2,421
Normal	17	42,5	23	57,5	40	100		

3.3 Relationship between Gender and Blood Pressure

Based on Table 2, it is known that respondents with hypertension were found to be male (72,3%) compared to female (63%). This shows the tendency that the male gender with the age of 20-30 years, is getting higher blood pressure. The results of statistical tests showed a significant relationship between gender and blood pressure (p-value = 0,001). From the results of the analysis, OR (Odds Ratio) value of 4,462 means that respondents who are male gender have 4,4 times the likelihood of having hypertension compared to female respondents.

3.3.1 The Relationship of Family History to Blood Pressure

Based on Table 2, it is known that respondents with hypertension found a family history of hypertension (70,5%) compared to no family history of hypertension (59,2%). This shows the tendency that a family history of hypertension, the higher the blood pressure. Based on the results of statistical tests show significant the relationship between family history and blood pressure (p-value = 0,004). From the results of the analysis, OR (Odds Ratio) value of 3,458 means that respondents with a family history of hypertension have 3,4 times the likelihood of experiencing hypertension compared to the respondents who had no family history of hypertension.

3.3.3 The Relationship of Body Mass Index to Blood Pressure

Based on Table 2, it is known that respondents with hypertension found abnormal nutritional status (64,1%) compared to normal body mass index (51,9%). This indicates a tendency that body mass index is abnormal, is getting higher blood pressure. The results of statistical tests showed no significant relationship between body mass index and blood pressure (p-value = 0,127). From the results of the analysis, OR (Odds Ratio) value of 1,923 means that respondents whose body mass index is in the abnormal category are 1,9 times more likely to have hypertension than respondents whose body mass index is in the normal category.

3.3.4 The Relationship of Smoking Habits to Blood Pressure

Based on Table 2, it is known that respondents with hypertension were found to have smoking habits (69,2%) compared to not have smoking habits (55,6%). This shows the tendency that having a habit of smoking is getting higher blood pressure. The results of statistical tests showed a significant relationship between smoking habits and blood pressure (p-value = 0,018). From the results of the analysis, OR (Odds Ratio) value of 2,813 means that respondents who have smoking habits are 2,8 times more likely to experience hypertension than respondents who do not have smoking habits.

3.3.5 The Relationship of Coffee Consumption to Blood Pressure

Based on Table 2, it is known that respondents with hypertension found coffee consumption (66%) compared to no coffee consumption (58,1%). This indicates a tendency for coffee consumption, is get higher blood pressure. The results of statistical tests showed a significant relationship between coffee consumption and blood pressure (p-value = 0,020). From the results of the analysis, OR (Odds Ratio) value of 2,696 means that respondents of coffee consumption have a 2,6 times greater likelihood of experiencing hypertension than respondents not consuming coffee.

3.3.5 The Relationship of Physical Activity to Blood Pressure

Based on Table 2, it is known that respondents with hypertension found physical activity in the inactive category (70,4%) compared to physical activity in the active category (66,7%). This indicates the tendency of physical activity in the category of inactivity, is to get higher blood pressure. The results of statistical tests showed a significant relationship between physical activity and blood pressure (p-value = 0,000). From the results of the analysis, OR (Odds Ratio) value of 4,750 means that physical activity respondents in the inactive category are 4,7 times more likely to experience hypertension than respondents who are active category of physical activity.

3.3.6 The Relationship of Stress Levels to Blood Pressure

Based on Table 2, it is known that respondents with hypertension found stress levels in the weight category (64,2%) compared to normal category stress levels (57,5%). This indicates the tendency of stress

levels in the weight category, is to get high blood pressure. The results of statistical tests showed a significant relationship between stress levels and blood pressure (p-value = 0,038). From the results of the analysis, OR (Odds Ratio) value of 2,421 means that respondents of the stress level of the weight category are 2,4 times more likely to experience hypertension than respondents with normal category stress levels.

4 DISCUSSION

4.1 The Relationship of Gender to Blood Pressure

The results of research through the respondent identity content method, the majority of respondents are male in the Perum Peruri. Based on the results of observations in the field caused by having a lifestyle such as smoking, coffee consumption, and lack of regular physical activity.

Male 3.8 has the effect of increasing blood pressure compared to females (Azhari, 2017). Lifestyles such as smoking, drinking coffee, and alcohol can increase blood pressure compared to females. Hormonal changes Females who go through menopause have higher blood pressure than males. (Hasrianto *et al.,* 2018). The results of the researchers' findings are different from the results because the total number of females is greater than males and has not entered the elderly (Vidiningsih *et al.,* 2022).

Males are known to be 2,3 at risk of increased blood pressure. Male lifestyles such as smoking tend to increase blood pressure (Departemen Kesehatan RI, 2006). Female awake estrogen hormone results in more flexible blood vessels, thus reducing the incidence of hypertension in females (Aristotle, 2018).

4.2 The Relationship of Family History to Blood Pressure

The results of research through family history questions using the interview method, some have a family history of hypertension in the Perum Peruri. This is because most of the respondents' parents know they have hypertension, but do not routinely go to health services.

Hypertension at risk 2 times with a family history of hypertension (Krisnawati & Eulis, 2018). Family history factors play a role in determining the occurrence of hypertension (Musfirah & Masriadi, 2019). Unlike the study (Hidayat & Agnesia, 2021), this is because the majority do not have a family history of hypertension.

Increased intracellular sodium levels, which leads to excessive secretion of triuretic hormones. The rise in blood pressure occurs when kidney cells release the enzyme renin, activating a blood protein called angiotensinogen (Subantara *et al.,* 2022). Based on Mendel's law, among parents who suffer from high blood pressure, the risk is 50%, but one parent has high blood pressure at a risk of 25% (Ina *et al.,* 2020).

4.3 The Relationship of Body Mass Index to Blood Pressure

The results of the study were through measuring the height of individuals with microtoice and body weight with weight scales, which were carried out twice. The majority of respondents in Perum Peruri have normal body mass index.

Someone with a normal body mass index then does not have high blood pressure (Melini & Tanuwijaya, 2021). As shown by previous studies (Ansar & Dwinata, 2019), individuals have normal and do not develop hypertension. Just like with underweight, the blood pressure of people with underweight does not increase (Telaumbanua & Tobing, 2022). So it doesn't interfere with blood circulation and heart function, and fatty plaques do not accumulate in blood vessels (Sari *et al.,* 2023).

Young adults with a body mass index of more than 25 with an increase in blood pressure 3 times compared to the normal body mass index of 18,5–25 and young adults underweight of 17–18,4 (Yulia & Nuzula, 2019). This can occur due to increased cardiac output caused by narrow blood vessels due to fat deposits, and increased blood volume (Cahyono, 2008).

Another theory has a different view, that being overweight causes circulatory problems, and increases pressure on artery walls. In this case, blood fat levels increase and blood vessels narrow. Narrowing occurs when plaque builds up in blood vessels made of fat. The greater the body mass, the more blood is needed to carry oxygen and nutrients throughout the body (Saragih *et al.,* 2021).

4.4 The Relationship of Smoking Habits to Blood Pressure

The results of the research obtained questions about smoking habits using the interview method, some respondents in the Perum Peruri were smokers with

non-filtered cigarettes. Non-filtered cigarettes have higher nicotine levels than filter cigarettes, filters are useful filters that filter inhaled tobacco smoke that enters the lungs. So that total nicotine has an impact on the body can be reduced (Setyanda *et al.,* 2015).

The nicotine contained in cigarettes directly increases blood pressure. Based on respondent survey responses, it was found that respondents generally have a habit of smoking carried out every day as much as 11-20 cigarettes/day for a period of ± 4 years (Nuryanti *et al.,* 2020). Respondents have high blood pressure and smoking habits ≥ 10 cigarettes/day, at risk of contributing to increased blood pressure (Manggopa *et al.,* 2017). Different research results were found, namely, smoking habits are not associated with high blood pressure. The majority do strenuous activities and the types of cigarettes used are filter cigarettes (Prang *et al.,* 2021).

Tobacco has the effect of damaging the walls of the arteries, resulting in high blood pressure. As a result, sensitive arteries accumulate plaque (arteriosclerosis). Nicotine can stimulate sympathetic nerves, make the heart work harder, and narrow blood vessels. In addition, carbon monoxide serves as an alternative to oxygen in the blood and urges the heart to meet the body's needs, namely oxygen. Indeed, tolerance to nicotine is relatively low, but its addictive properties can make the body dependent on this substance. Increased heart rate causes vasoconstriction (narrowing) of blood vessels, and increased blood pressure (Erman *et al.,* 2021).

4.5 The Relationship of Coffee Consumption to Blood Pressure

The results of the research obtained coffee consumption questions using the interview method, the majority of respondents in Perum Peruri consumed coffee with moderate intensity (3-4 cups/day). The average serving of coffee is 20 grams by choosing the type of instant or mixed coffee. A single caffeine dose of 200–250 mg, or 2–3 cups of coffee, was shown to increase systolic blood pressure to 3–14 mmHg and diastolic blood pressure to 4–13 mmHg (Katsilambros *et al.,* 2013).

According to research found (Melizza *et al.,* 2021) which found that increasing coffee consumption further increases blood pressure. The blood pressure of people who do not consume coffee is lower than people who consume 1-3 cups of coffee daily, and people who consume 3-6 cups of coffee daily have high blood pressure (Rahmawati *et al.,* 2023). Drinking coffee does not have too much influence on their blood pressure. However, blood pressure rises briefly and then returns to normal (Fitriayani *et al.,* 2020).

Biological mechanisms of caffeine binding to adenosine receptors, activation of the sympathetic nervous system by increasing plasma catecholamine concentrations, stimulation of the adrenal glands, and increased cortisol production. Affects vasoconstriction and increases total peripheral resistance, resulting in increased blood pressure. Someone accustomed to coffee consumption of 1-2 cups 1 day risk hypertension 4,12 times compared to people who do not consume coffee (Kurniawaty & Insan, 2016). A study shows that 100-200 mg of caffeine (1-2,5 cups of coffee) daily is the safe limit recommended by some doctors (Food and Drug Administration, 2007).

4.6 The Relationship of Physical Activity to Blood Pressure

Research results obtained by the Global Physical Activity Questionnaire (GPAQ), most of the physical activity in the Perum Peruri is in an inactive category with total METs < 600. This condition is related to the Daily respondents who are mostly office workers, college, and freelancers. Relatively low physical activity, but done routinely every day. Daily activities involve at least 10 minutes on foot (e.g. walking to the place places of worship, vehicle parking, and bus stops). While on the level of active physical activity with a total of Mets ≥ 600

Previous research (Marleni *et al.,* 2020) found that physical activity and high blood pressure are strongly linked. Low physical activity contributes to hypertension (Jehaman, 2020). Another study found different results, if the level of physical activity is carried out in the active category, it can help someone avoid high blood pressure (Marwah *et al.,* 2022).

In inactive physical activity, individuals have higher heart rates. As a result, each contraction increases the strength of the heart muscle. Blood pressure increases when the heart muscle pumps blood harder, causing peripheral resistance. Lack of physical activity is a risk of high blood pressure and obesity (Muhammadun, 2010).

Regular exercise such as cycling, running, and aerobics increases blood flow and lowers blood pressure. A person who is sedentary is generally overweight. Exercise can reduce and prevent obesity (Dalimartha *et al.,* 2008).

4.7 The Relationship of Stress Levels to Blood Pressure

The results of the study obtained the statement of Depression Anxiety and Stress Scale (DASS), most

of the stress levels in the Perum Peruri in the category of severe stress levels. Psychosocial stress can stem from events that change a person's life. Some examples of psychosocial stress such as marriage, work, socialization between communities, finances, family, and disasters (Yosep, 2014).

The pituitary brain gland secretes hormones from the endocrine gland if there is a threat, activating the hormone adrenaline so that it has an effect on increasing blood pressure (Rahmadhani, 2021). This finding is supported by the fact that pulse, blood pressure, and breathing frequency increase as a result of physiological stress responses (Sutarjana, 2021). However, in contrast to the findings, the majority of individuals have normal blood pressure and low stress levels (Arum, 2019).

Stress activates the sympathetic nervous system, causing blood vessels to narrow (vasoconstriction). Hypertension is caused by an increase in blood pressure during periods of stress (Junaidi, 2010). However, many experts believe that stress is only temporary. In other words, blood pressure drops as the mind calms down. High blood pressure is the result of long-term stress (Medika, 2017).

5 CONCLUSION

General description of blood pressure in Perum Peruri Tangerang City the majority of pre-hypertension, age 20 years, the majority gender is male, has no family history of hypertension, body mass index in the category of normal, does not have smoking habits, not regular coffee consumption daily, physical activity in the inactive category, and stress levels in the moderate stress level category.

Chi-Square test analysis of six variables has a significant relationship with blood pressure, gender, history of family hypertension, smoking habits, coffee consumption, physical activity, and the level of stress. However, body mass index variables have no significant relationship with blood pressure.

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THE EFFECTIVENESS OF LIME JUICE FOR REDUCING LEAD (Pb) IN GREEN MUSSELS AT MUARA ANGKE MARKET, NORTH JAKARTA IN 2023

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Keywords: *Lime juice, lead, green mussels*

Abstract: Due to various human activities around Jakarta Bay, such as residential development, tourism, industry, transportation, etc produces waste can pollutes the sea. One of the pollutants into the sea is the heavy metal lead (Pb). Green mussels are marine biota act as filter feeders, often used as a natural indicator of environmental control. So that heavy metals easily accumulate in it. The research aims to determine the most effective lime water soaking time to reduce lead levels in green mussels, making them safe for consumption, it's important for public awareness and health protection. The study involved collecting ten samples were taken from ten randomly selected traders at Muara Angke Fish Market and used a quantitative experiment with a post-test control group design for analysis. The data were analyzed descriptively with Kruskal-Wallis and then the paired T test. The results of the study showed average lead level in green mussels before intervention was 0.1578 mg/kg after being given lime water soaking, with results of 0.0680 mg/kg (15% for 30 minutes); 0.0344 mg/kg (15% for 60 minutes); 0.0399 mg/kg (30% for 30 minutes); and 0.0137 mg/kg (30% for 60 minutes). So the most effective immersion is 30% for 60 minutes (P value of 0.005).

1 INTRODUCTION

Due to various human activities around Jakarta Bay such as residential development, tourism, industry, transportation and others produce waste can pollutes the sea. One of the pollutant substances on the sea is the heavy metal lead. Heavy metals, which is have stable concentrations, are difficult to decompose and are toxic. According to Yulianto, waters polluted by heavy metals will decrease in quality and experiencing deposition (Barokah., 2019). Because marine biota that live on the bottom of the waters and its surroundings, such as shellfish, to have a very large risk of being contaminated with heavy metals. One type of marine biota that lives in the waters is green mussels. Green Mussel (Perna viridis) has affordable economic value, high protein nutrition and is easy to cultivate so many people make it a livelihood, especially fishermen who are on the coast of the bay. Green mussel are marine biota act as a filter feeders, often used as a natural indicator of environmental control causing heavy metals to easily accumulate in the body of the clam (Dharmadewi & Wiadnyana, 2019)

Lead is harmful if consumed by inhaling contaminated air, water, food or dust. Lead poisoning can occur through oral ingestion, consumption of food or fluids, inhalation, or skin contact (Adhani & Husaini, 2017). Research by Barokah (2019) in Cilincing Teluk Jakarta found lead levels in green mussels of 0.29 kg/mg in 2016. That research was supported by data from the Indonesian Scientific Research Institute d levels in clam meat Green mussels in Jakarta Bay waters in April 2017 were 29.4 kg/mg, so green mussels at that location were unfit for consumption because the standard for lead levels in shellfish meat according to the Indonesian National Standard (SNI) had a sdwqamaximum limit of 1.5 mg/ kg (SNI, 2009). People who consume lead-contaminated mussels will directly harm the development of children's body tissues, and prolonged exposure can harm the brain. . Lead is a metal that can dissolve in fat directly or indirectly

because an acid solution can damage the interaction of metal-protein complexes (Setiawan et al., 2012)

Aprilliasari said on the carboxylic group of the citric acid molecule, which has four pairs of lone electrons, metal ions can accept these electrons and form complex ions which are easily soluble in water. Lead combines with proteins in the shells to produce metallothionein compounds (metal-binding proteins). When citric acid is available, lead is released from the shell body and binds with OH- and COOH- ions to form the compound pb citrate (Nurmalasari & Zaenab, 2015)

Citric acid had several types ranging from natural and synthetic. Citric acid is present in a wide variety of fruits and vegetables, although citrus fruits such as lemons, limes and kaffir limes have the highest concentrations of citric acid, with a dry weight concentration of up to 8%. Lime can be found in Indonesia. It has the characteristics of a round to ovoid fruit shape, a fruit diameter of about 3-6 cm, and a fruit skin thickness of ranging from 0.2 - 0.5 mm. The tree is small with dense but irregular branches, has height is between 1.5 - 5 meters, short thorny branches, and leaf sizes are oval and circular in shape (Sarwono, 2006). In every 100 grams of lime (Citrus Aurantifolia Swingle) there is 5.56 grams of citric acid and 2.7 grams of ascorbic acid. These chemicals have the ability to bind metals The higher the acid content in lime, the greater the chance of reducing lead levels in green mussels (BPPT, 2002; Hilmi et al., 2017). The quality of lime that can be used according to Ondu & Jayadipraja, (2017) is from the color, clarity and texture of the skin, the thinner the more water content, not the size of the fruit.

Based on this information, the researcher intends to conduct this study, the samples of which come from the Muara Angke fish market, North Jakarta, to determine the effect and comparison of soaking time in lime juice solution in reducing lead levels in green mussels at levels of 15% and 30%, respectively, soaking times of 30 and 60 minutes, so that the green mussels can be consumed by the general public part of an effort to prevent health problems.

2 SUBJECTS AND METHODS

The form of this study is experiment. Which is to see differences in lead levels in green mussels before and after intervention. This research was conducted in April 2023 - July 2023. The study involved collecting ten samples were taken from ten randomly selected traders at Muara Angke Fish Market and used a quantitative experiment with a post-test control group design for analysis. The sample was divided into 5 groups, One group for control and four groups for intervention, namely by adding a solution of 15% and 30% lime juice for 30 and 60 minutes respectively. After that the samples carried to the DKI Jakarta provincial health laboratory to analyze lead levels in green mussels before and after the intervention use ICP OES (Inductively Coupled Plasma Optical Emission Spectrometry) machine. The data analysis was performed using software for univariate and bivariate. Univariate analysis was performed to demonstrate frequency of each variable and bivariate analysis with Kruskal-Wallis to determine the effect of the treatment from the experiment and then tested the paired T test to compare which treatment was more effective.

3 RESULTS

From all the results of inspection of the lead content control samples found in green mussels, there was an average of 0.15780 mg/kg of lead which was still within safe limits for consumption, when compared to the BPOM (BPOM RI, 2022) regulations of 1.0 mg/kg and the Indonesian National Standard of 1.5 mg/kg for this type of shellfish (SNI, 2009)**.**

Table 1: The results of measuring the reduction of lead levels for each intervention.

Groups	n	Average lead (mg/kg)
Control	10	0,15780
Lime 15% Duration 30 minutes	10	0,06820
Lime 15% Duration 60 minutes	10	0,03440
Lime 30% Duration 30 minutes	10	0,03990
Lime 3Q0% Duration 60 minutes	10	0,01370

The four groups as the intervention group with 10 samples each obtained the results as shown in table 1, namely the average lead level examination results in green mussels after the intervention showed limits for consumption.

Table 2: Results of examination of lead levels in green mussels after intervention at Muara Angke Market.

Lime Water	Average lead (mg/kg)		Persen-tage (%)	SD	P *value*
	Pre-test	Post-test			
15% for 30 minutes	0,1578	0,0682	8,96	0,0284	0,023
15% for 60 minutes	0,1578	0,0344	12,34	0,0232	0,014
30% for 30 minutes	0,1578	0,0399	11,79	0,0396	0,005
30% for 60 minutes	0,1578	0,0137	14,41	0,0076	0,005

From table 2 it can be seen the difference in lead levels in green mussels before and after being given the intervention, the lead levels in the samples before the intervention were 0.1578 mg/kg which decreased after being given the intervention. The results of the paired t test sample on all samples of the intervention group showed a p-value < 0.05.

That is meaning there was have a difference in the decrease in levels. The best intervention was in the 4th intervention, namely soaking green mussels in 30% lime juice for 60 minutes reduced lead levels by 0.01370 mg/kg, representing a reduction of 14.41%.

4 DISCUSSION

The results of examining lead levels in green mussels (Perna viridis) were carried out using ICP-OES (Inductively Coupled Optical Emission Spectrometry) at the Regional Health Laboratory of DKI Jakarta Province, obtained data values for lead levels in green mussels from Muara Angke Market, North Jakarta, all contained lead below the threshold which has been determined by BPOM and SNI with a maximum limit of 1.0 mg/kg and 1.5 mg/kg for clams.

The low levels of lead in green mussels are influenced by the shells' living habitat around the sea. The low levels of lead in green mussels are influenced by the shellfish's living habitat around the sea. According to Wahyuningsih (2015), the cause of the low levels of lead in green mussel meat is the change in the location of green mussel cultivation to the middle of the bay due to the dense activity of residents around the bay and during the eastern season (April to October), where this research was conducted. In the months included in the east season as the rainy season.

Soft animals (molluscs) such as green mussels are inhabit in the sea, especially in coastal and estuarine areas, absorb organic substances as food, like the heavy metal lead. Their habitat plays a major role in their development. If their habitat contains harmful organic particles absorbed by green mussels, it will have a negative effect on the people who consume them. An additional factor contributing to the selection of mussels for biomonitoring research is their sedentary nature, longevity, ease of identification and sampling, relative abundance and year-round availability, and tolerance to pollution and natural environmental variations. According to Yap et al., (2004) they are also significant from an ecological standpoint and have strong net accumulation capacity.

Numerous countries have proposed using mussels as a viable biomonitoring agent for heavy metals, given their well-known ability to accumulate a wide spectrum of contaminants in their tissues (Phillips, 1995; Yap et al., 2003).

Based on interviews and observations of researchers, green mussels come from cultivation sites in the Muara Angke area and the wind that blows around the market is quite strong because it enters the eastern season (June, July, August). The volume of air contained in the sea during the the eastern season as the rainy season has an influence on pollutants such as heavy metals, so the concentration is low (Riani et al., 2017).

The results of the values obtained were the average lead levels of the group before the intervention, which was 0.1578 mg/kg. The value obtained in intervention 1 was 0.06820 mg/kg (8.96%) with a p-value < 0.05 (0.023). The value obtained in intervention 2 was 0.0344 mg/kg (12.34%) with a p-value < 0.05 (0.014). The value obtained in intervention 3 was 0.0399 mg/kg (11.79%) with a p-value < 0.05 (0.005). The value obtained in intervention 4 was 0.0137 mg/kg (14.41%) with a p-value < 0.05 (0.005). Once it is

According to Setiawan, et al (2012) lead is a metal that can dissolve in fat directly or indirectly because an acid solution can damage the interaction of the metal protein complex formed, this is also supported by (Kristanto, 2002) heavy metals can dissolve in fat with by immersing it in an acid solution, the fat will form a smooth emulsion and dissolve in the acid solution, thereby indirectly dissolving the heavy metal content. Metals in general can form bonds with natural and artificial organic compounds. This bond can be formed through the production of organic salts with carboxylic groups such as tartaric acid, citric acid, and so on.

The results of this study are in line with research by Zaenab (2015) who described initial lead levels before treatment in two samples of Marcia Hiantina

mussel meat, namely an average of 0.479 mg/kg, after soaking in lime juice with a concentration of 15% in 30 minutes of soaking time with an average yield of 0.257 mg/kg (29.57%) and increased to 0.169 mg/kg (41.54%) after soaking for 60 minutes with the same lime concentration. In addition, soaking green mussels with 25% lime juice for 25 minutes resulted in a decrease in lead levels of 0.844 mg/kg from before soaking, namely 1.755 mg/kg, this could happen because lime contains 7.75% citric acid which the higher the acid content of lime, the greater the chance that lead in green mussels can be reduced (Hilmi et al., 2017).

Lime as an ingredient that is commonly used in seafood processing in the community to get rid of the fishy smell has another function, namely being a lead reducing agent because of the citric acid contained in lime. Citric acid is a protic hydrophilic (polar) solvent such as water and ethanol which can dissolve organic salts as polar substances and sugars as non-polar, including oil and elements such as sulfur and iodine which contain lead (Nurdiani, 2012). If a substance containing citric acid meets lead, the two compounds will be bound in the protein present in the Green mussel meat to form a metalloenzyme compound, which gives the metal ion four loose electrons. Once released, the lead then attaches to the OH- and COOH- ions in citric acid to produce lead citrate (Indasah, 2012).

As a metal binding agent, citric acid has a function as a sequestran. The chemical formula for citric acid is $CH_2COOH{-}COHCOOH{-}CH_2COOH$ ($C_6H_8O_7$), Citric acid's -OH and COOH functional groups combine with metal ions to generate citrate salts when citrate ions are present (Sinaga et al., 2013).

5 CONCLUSION

This study shows citric acid contained in lime can reduce lead levels in green mussels which before intervention is 0,15780 mg/kg after intervention by given lime juice 30% for 60 minutes down to 0,0137 mg/kg. This means the greater lime concentration used and the longer the soaking time, the lower the lead content. It is highly recommended for the general public, especially coastal communities who consume seafood to prevent the effects of consuming lead-contaminated mussels.

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INCIDENCE OF INSUFFICIENT INTAKE OF MICRONUTRIENTS IN ADOLESCENTS AT THE YOUTH POSYANDU, PARIAMAN, INDONESIA

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Keywords: Gender, Age, Physical Activity, Socioeconomic, Insufficient intake of micronutrient

Abstract: Micronutrients are nutrients that the body requires in small amounts, but play a crucial role. Micronutrients are obtained from external sources, such as food or supplements, because the body cannot produce them in sufficient quantities to meet its needs. The phenomenon of adolescent growth necessitates high nutritional requirements in order to achieve maximum growth potential, as nutrition and growth are interdependent. One of the difficulties faced by adolescents is insufficient intake of micronutrient. Insufficient intake of micronutrient is a condition in which the body does not receive enough iron (Fe) and vitamin A. The study aims to find out the prevalence of micronutrient deficiencies among adolescents in the Youth Integrated Post Service of Pariaman City. The study employed a cross-sectional design. The population was all 10-18-year-olds enrolled with the Youth Posyandu of Kp. Jawa I amounted to 52 people while the South Tungkal Andestura Posyandu amounted to 34 people. The sampling technique used was a total sample. The statistical test employed was bivariate Chi-square analysis. The result showed that 1) gender, age, and physical activity had no effect on the prevalence of insufficient intake of micronutrient among adolescents. 2) Socioeconomic influenced on insufficient intake of micronutrient conditions in adolescents. A low socioeconomic level could impact dietary choices. Where most expenditures go toward meeting food requirements, with a focus on carbohydrates. Because foods high in carbohydrates are less expensive than foods rich in micronutrients, the demand for micronutrient-rich diets would be difficult to meet, which could affect the prevalence of micronutrient deficiency conditions. There was no significant relationship between the variables of gender, age, and physical activity with the incidence of insufficient intake of micronutrient in the Kota Pariaman Youth Posyandu. There is a significant relationship between socio-economic variables and the incidence of insufficient intake of micronutrient at the Kota Pariaman Youth Posyandu.

1 INTRODUCTION

Insufficient intake of micronutrient is the lack of micronutrients including vitamins and minerals (Vitamin A, Folic Acid, Iodine, Iron, and Zinc). Insufficient intake of micronutrient disorders consist of Nutritional Anaemia, Vitamin A Deficiency, and Iodine Deficiency Disorders. Meanwhile, iron deficiency is a common insufficient intake of micronutrient that has an impact on developmental delays and behavioural problems (Kementerian Kesehatan Republik Indonesia, 2016). Also affecting every age group, nutritional anaemia primarily affects adolescents, pregnant women, and women of childbearing age.

Insufficient intake of micronutrient is a major impediment to good health and nutritional status, as well as the development of a significant proportion of children into adulthood, where micronutrient deficiencies are responsible for considerable

mortality and morbidity (Kapil & Bhavna, 2002). Insufficient intake of micronutrient can be identified by examining the prevalence of anemia in adolescents. According to the 2007, 2013, and 2018 Basic Health Research (Riskesdas), the prevalence of anemia in adolescents had increased significantly. In 2007, the frequency of anemia among adolescents was 6.9%. Then, it had risen to 18.4% by 2010. Next, it had reached 32% by 2018. Based on Riskedas (2018), there were 3 until 4 out of 10 adolescents in Indonesia who had anemia.

The Youth Posyandu (Indonesia: Pos Pelayanan Terpadu abbreviated Posyandu) of Pariaman City is an Posyandu located in Pariaman City that conducts nutritional status monitoring in the form of stunting and overweight. However, the nutritional status of insufficient intake of micronutrient was not monitored. According to the results of a preliminary study conducted in the Youth Posyandu of Pariaman City, there were 4 out of 12 adolescents showed vitamin deficiency. The conditions of insufficient intake of micronutrient were determined by analyzing the 24-hour food recall. Therefore, the researchers were interested in studying the prevalence of micronutrient deficiencies among adolescents at the Youth Posyandu in Pariaman City.

Adolescents are generally excluded from population-based nutritional assessments because they are considered less susceptible to malnutrition than other groups, such as young children, as well as pregnant and lactating women. In addition, the procedures used to evaluate the nutritional status of adolescents were not as standardized as those used to evaluate the nutritional health of children. Nevertheless, adolescents are susceptible to iron, vitamin A, and other micronutrient deficiencies. Various global research have revealed that iron deficiency can affect cognition, memory, and focus in pre-adolescents and adolescents (Woodruff et al., 2006). Vitamin A deficiency has recently been identified in adolescents. Hence, vitamin A supplementation was advised for women of reproductive age (15-49), which encompassed late adolescence (Ross, 2002).

Poor micronutrient status during adolescence was described by Viteri & Gonzalez (2002), along with its causes and negative effects. Iron deficiency is caused by inadequate iron bioavailability and poor iron consumption. Chronic blood loss, such as hookworm infections and other illnesses, also contributes. Iron deficiency thus affected nearly all body functioning. According to West et al. (1999), vitamin A deficiency was primarily caused by inadequate intake beginning with breastfeeding and animal fat. Consequently, it is the leading cause of childhood blindness in developing-world populations. Vitamin A also protects against infection, improves reproductive function and embryo development, and contributes to development and sensory function, in addition to its function in eyesight. Carotene and vitamin A enhance iron uptake and metabolism. Therefore, a deficiency in iron-containing foods can inhibit the absorption of vitamin A and fat.

According to Woodruff et al. (2006), the rapid growth in height, muscular mass, and fat mass throughout adolescence resulted in a greater daily need for iron and vitamin A than in other age groups. The study targeted adolescents in refugee camps whose aid-dependent population could not fulfil the increased demand for food. In addition, a wide range of studies conducted on stable but impoverished populations indicated that vitamin A and iron deficiencies were prevalent among adolescents and various age groups (Ene-Obong et al., 2003). Due to the lack of food availability and changes in eating patterns that frequently occur in teenagers, socioeconomic status has a significant effect on the purchasing ability of adolescent families to meet their daily needs.

2 METHOD

This research has been approved by the Research Ethics Committee Of The Faculty Of Medicine Sebelas Maret University and has been declared ethically approved.

The research design used was a cross-sectional study. The research was conducted at the Youth Posyandu in Pariaman City. This Posyandu was located at the Youth Posyandu of Kp. Jawa and South Tungkal Andestura Posyandu. Respondents who were involved in this study were adolescents aged 10-18 years who were enrolled in the Kp. Jawa I amounted to 52 people and South Tungkal Andestura Posyandu amounted to 34 people. The sampling technique used was total sampling. The inclusion criteria for this study were adolescents registered at Youth Posyandu of Kp. Jawa I and South Tungkal Andestura Posyandu, aged 10-18 years according to Regulation of the Minister of Health of the Republic of Indonesia Number 25 of 2014 and be willing to become research subjects. Meanwhile, the exclusion criteria in this study included respondents who were absent during the study and stated to withdrew.

3 RESULT AND DISCUSION

In the results of this study, an overview or characteristics of each variable are presented in the form of a distribution table to determine the frequency and percentage of variables in each group. The incidence of insufficient intake of micronutrient in adolescents was measured using the 3x24 hour recall interview method which was processed using the established nutrisurvey application and the measurement results were grouped into two, namely the group of adolescents with status of occurrence of micronutrient deficiencies and not micronutrients. The results of bivariate chi square analysis are used to see the relationship between the independent variables and the dependent variable. To control it, a logistic regression test was carried out with a statistical test using Chi-Square.

Table 1: Characteristics of the Sample Relationship of Gender, Age, Physical Activity, and Socioeconomic with Insufficient intake of micronutrient Incidence at Youth Posyandu Kota Pariaman.

Variabel	Kriteria	n	Mean	SD	Minimum	Maksimum
Age	< 15 years old	37	16.3	1.35	13	18.9
	≥ 15 years old	49				
Income(Rp)	less <Rp1.990.170	30	2,393,344	1.24	1.600,000	4,300,000
	enough ≥Rp1.990.170	56				
Physical Activity (PAL)	less PAL < 1,70	17	1.6	0.16	0.9	2.3
	enough	69				
Defisiensi Mikronutrien	Defisiensi	27	19.8	0.10	27.2	35.6
	Not defisiensi	59				

Table 1 shows the characteristics of the sample of youth at the youth posyandu in Pariaman where in the age variable (years) the average age of the respondents is 16.3 years with a standard deviation of 1.35, the minimum age is 13 years and the maximum age is 18.9 years. In the income variable, the average income is Rp. 2,393,244 with a standard deviation of 1.24, the minimum income is Rp. 1,600,000 and the highest income is Rp. 4,300,000. Physical activity is calculated in PAL units, the average value is 1.6 PAL, with a standard deviation of 0.16, the minimum value is 0.9 PAL and the maximum value is 2.3 PAL. The insufficient intake of micronutrient variable by looking at the processed nutrisurvey results showed that 27 adolescents experienced micronutrient deficiencies and 59 adolescents experienced micronutrient deficiencies. The average value of the insufficient intake of micronutrient variable is 19.8 SD with a standard deviation value of 0.10, the minimum Z-score is 27.2 SD and the maximum value is 35.6 SD.

Table 2: Frequency Distribution of Iron and Vitamin A Micronutrient Deficiencies in Adolescents.

Condition of Deficiency Mikronutrient	Iron		Vitamin A	
	n	%	n	%
Defisiensi Mikronutrien	20	23.3	24	28
Female	13	65	10	41.7
Male	7	35	14	58.3
Not Defisiensi	66	76.7	62	72
Female	31	47	34	54.8

Male	35	53	28	45.2

Primary Data Source (2022)

The description of the frequency distribution of the incidence of insufficient intake of micronutrient in adolescents is that 13 adolescent girls experience iron deficiency and 10 adolescents experience vitamin A deficiency. Among male adolescents 7 adolescents experience iron deficiency and 14 adolescents experience vitamin A deficiency. Respondents who did not experience iron deficiency were 31 female adolescents and 35 male adolescents while respondents who did not experience vitamin A deficiency were 34 female adolescents and 28 male adolescents.

Bivariate Analysis

Table 3: Results of the Chi-Square Test on the Relationship of Gender, Age, Physical and Socioeconomic Activity to Insufficient intake of micronutrient Conditions.

Variable	Criteria	Mikro	%	Not Mikro	%	OR	CI 95%		P
							Lower	Upper	
Gender	Male	14	33.3	28	66.7				
	Female	13	29.5	31	70.5	1.19	0.463	2.878	0.705
	Total	27	31.4	59	68.6				
Age	< 15 y.o	15	40.5	22	59.5				
	≥ 15 y.o	12	24.5	37	75.5	2.10	0.810	5.164	0.115
	Total	27	31.4	59	68.6				
Physical Activity	Less <pal 1,70	4	23.5	13	76.5				
	enough pal ≥ 1,70	23	33.3	46	66.7	0.62	0.176	2.056	0.438
	Total	27	31.4	59	68.6				
Social ekonomi	Less ≤1.990.170	22	73.3	8	26.7				
	Enough ≥ 1.990.170	5	8.9	51	91.1	28.05	8.081	93.587	<0.001
	Total	27	31.4	59	68.6				

Table 3 presents the results of the bivariate analysis. As many as 33.3% of respondents in the male adolescent group experienced micronutrient deficiencies, while in the female adolescent group it was 29.5%. Of the total respondents studied, 70.5% of respondents in the female adolescent group did not experience micronutrient deficiencies. Furthermore, from the two groups of teenagers, there were 42 boys and 44 girls. Of the 42 male adolescents at the youth Posyandu who experienced micronutrient deficiencies, 14 were adolescents with OR = 1.19. Then, out of 44 female adolescents who experienced micronutrient deficiencies, 13 were adolescents. Statistically, there was no significant relationship between gender and the incidence of micronutrient deficiencies in adolescents at the Kota Pariaman Youth Posyandu with p = 0.705.

As many as 40.5% of adolescents in the age group <15 years experienced micronutrient deficiencies, while in the group of adolescents > 15 years as much as 24.5%. Of the total respondents studied, as many as 75.5% of respondents in the group of adolescents > 15 years did not experience micronutrient deficiencies. Furthermore, from the two groups of adolescents, there were 37 adolescents aged <15 years and 49 adolescents aged > 15 years. A total of 37 adolescents aged <15 years at the youth Posyandu who experienced micronutrient deficiencies were 15 adolescents (40.5%) with OR = 2.10. Then, of the 49 adolescents aged > 15 years who experienced micronutrient deficiencies, 12 (24.5%) experienced micronutrient deficiencies. Statistically, there was no significant relationship between age and the incidence of micronutrient

deficiencies in adolescents at the Kota Pariaman Youth Posyandu with p = 0.115.

As many as 23.5% of adolescents in the less physical activity group < pal 1.70 experienced insufficient intake of micronutrient events while in the adolescent group with sufficient physical activity pal > 1.70 as many as 33.3%. Of the total respondents studied, as many as 66.7% of respondents in the adolescent group with sufficient physical activity pal > 1.70 did not experience micronutrient deficiencies. Furthermore, from the two groups of adolescents, the number of adolescents with less physical activity < pal 1.70 was 17 people and adolescents with moderate physical activity > 1.70 were 69 people. Of the 17 adolescents who had less physical activity <pal 1.70 at the youth Posyandu, 4 youths (23.5%) experienced micronutrient deficiencies with OR = 0.62. Then, out of 69 teenagers who had sufficient physical activity, pal > 1.70 experienced micronutrient deficiencies, 23 teenagers (33.3%). Statistically, there was no significant relationship between physical activity and the incidence of micronutrient deficiencies in adolescents at the Kota Pariaman Youth Posyandu with p = 0438.

As many as 73.3% of adolescents in the less socioeconomic group <1,990,170 as seen based on family income for 1 month experienced micronutrient deficiencies while in the group of adolescents with sufficient socioeconomic conditions > 1,990,170 as many as 8.9%. Of the total respondents studied, as many as 91.1% of respondents in the adolescent group > 1,990,170 did not experience micronutrient deficiencies. Furthermore, from the two groups of adolescents, the number of adolescents with less socio-economic <1,990,170 was 30 people and adolescents with sufficient socio-economic> 1,990,170 were 56 people. Of the 30 adolescents whose family socioeconomic conditions were less than <1,990,170 at the youth Posyandu, 22 adolescents (73.3%) experienced micronutrient deficiencies with OR = 28.05. Then, out of 56 teenagers who had family socioeconomic conditions > 1,990,170, 5 teenagers (8.9%) experienced micronutrient deficiencies. Statistically, there was a significant relationship between socio-economic conditions and the incidence of micronutrient deficiencies in adolescents at the Kota Pariaman Youth Posyandu with a p value <0.001.

4 DISCUSSION

Effect of Gender on Insufficient intake of micronutrient Condition

As shown in Table 3, from 42 male adolescents, there were 14 adolescents (33.3%) who experienced insufficient intake of micronutrient condition with OR = 1.19. Then, from 44 female adolescents, there were 13 adolescents (29.5%) who had insufficient intake of micronutrient. In addition, female adolescents who did not experienced insufficient intake of micronutrient conditions are 31 adolescents (70.5%). Statistically, there was no significant relationship between gender and insufficient intake of micronutrient conditions in adolescents in the Youth Posyandu of Pariaman City with p = 0.705.

Before adolescence, the nutritional needs of boys and girls are not differentiated. Nevertheless, during adolescence, hormonal and physiological changes that are gender-specific lead nutritional needs to diverge. For example, because young girls menstruate monthly, they require extra iron (Idai.or.id, 2013). Insufficient intake of micronutrient, especially iron deficiency, anemia, and malnutrition problems, both undernutrition and short stature and overnutrition to obesity with co-morbidities, both of which are frequently related to improper eating behaviour, are the most prevalent nutritional problems in adolescents (Patimah, 2017).

Furthermore, this study indicates that gender has no effect on the prevalence of insufficient intake of micronutrient among adolescents. It is because the estimation of adolescents' micronutrient nutritional needs is typically based on the Recommended Daily Allowances (RDA). Based on clinical, biochemical, anthropometric, nutritional, and psychological tests, adolescents' micronutrient requirements must be evaluated on an individual basis (Milasari, 2019).

The high need for energy and nutrients in adolescents is due to changes and increases in various body dimensions (weight and height), body mass, and body composition. About 15-20% of adult height is gained during adolescence. Linear growth can be slow or stunting if food or energy adequacy is severely lacking or energy expenditure increases. Approximately 25-50% of the final ideal adult body weight is gained during adolescence. The time of achievement and the amount of weight gain is strongly influenced by food or energy intake and energy expenditure. During pre-puberty, the proportion of fat and muscle tissue as well as lean body mass in boys and girls is the same. Boys who are rapidly growing experience proportionally more muscle tissue than fat tissue, as well as lean body

mass compared to girls. However, there is a failure to increase bone mass in women with late puberty so that bone density is lower in adulthood. Nutrition is one of the environmental factors that also determine the onset of puberty (Idai.or.id, 2013).

Effect of Age on Insufficient intake of micronutrient Condition

As seen in Table 3, it shows that there are 37 adolescents aged <15 years where 15 adolescents (40.5%) experienced micronutrient deficiencies with OR = 2.10. Meanwhile, there are 49 adolescents aged > 15 years where 12 adolescents (24.5%) experienced micronutrient deficiencies. Based on all the adolescents studied, there are 37 adolescents (75.5%) were aged > 15 years who did not have micronutrient deficiencies. Statistically, there was no significant relationship between age and insufficient intake of micronutrient conditions in adolescents at the Youth Posyandu in Pariaman City with p = 0.115.

The reason why it occurs is that adolescents undergo psychological and social changes in addition to biological and physiological changes. Variations exist in the timing and duration of the transition from childhood to adulthood, which are impacted by sociocultural and economic variables. In addition, although though adolescents share the same sociocultural environment, they are not a homogeneous group, as they vary widely in terms of development, maturity, and lifestyle (Meilan et al., 2018). According to research conducted by Blum in 1991 on 15-18-year-olds adolescents (Idai.or.id, 2013), male adolescents were more confident, felt happier and healthier, and were less susceptible than female adolescents, who tended to be unsatisfied with their body condition, personality, and health.

Moreover, adolescents between the ages of 10 and 18 years are a sensitive demographic for malnutrition (Lubis, 2021). Where one of the challenges faced by Indonesian adolescents is the problem of micronutrient nutrition, as approximately 12% of male adolescents and 23% of female adolescents suffer from anemia, which is mostly caused by iron deficiency (Kemkes.go.id, 2018). The malnutrition is not a random occurrence. The reasons of adolescent malnutrition include unhealthy eating behaviors, an active lifestyle, and diets designed to meet adolescent beauty standards (Lubis, 2021).

Micronutrients are nutrients required by the body in minute quantities, but play a vital role in the production of hormones, enzyme activity, and the regulation of immunological and reproductive function. Micronutrients comprise both water- and fat-soluble vitamins and minerals. Micronutrients are taken from external sources, such as food or supplements, because the body cannot generate them in sufficient quantities to meet its needs. Although only extremely little amounts are required by the organism, micronutrients are essential (foodtech.binus.ac.id, 2015).

Furthermore, this study shows that age has no effect on the prevalence of micronutrient deficiencies among adolescents in the Youth Posyandu of Pariaman City. It is due to the fact that adolescents' high preferences for particular meals result in unfulfilled nutritional needs in the body. Adolescents are unconcerned with the requirement for nutrients and the consequences that can result from a lack of nutrients (Winarsih, 2018). The food patterns of adolescents include the consumption of snack items such as fried meals, colorful beverages, soft drinks, and fast food. Many adolescents believe that their nutritional demands are met if they eat a lot of food and have a full stomach (Mardalena, 2017).

Because adolescents are unconcerned with calorie intake and energy expenditure, adolescence is highly vulnerable to extraneous influences. Adolescents' typical eating habits include consuming fried snacks, colorful beverages, and fatty foods. Various factors, such as environmental conditions and schoolmates, contribute to the development of unhealthy eating patterns in adolescents (Almatsier et al., 2011).

Effect of Physical Activity on Insufficient intake of micronutrient Condition

Table 3 shows that there are 17 adolescents who had poor physical activity (< pal 1.70) where 4 adolescents (23.5%) experienced micronutrient deficiencies with OR = 0.62. Whereas, there are 69 adolescents who had sufficient physical activity (PAL > 1.70) where 23 adolescents (33.3%) experienced micronutrient deficiencies. Based on all the adolescents studied, 46 adolescents (66.7%) had sufficient physical activity (pal > 1.70) who did not experience micronutrient deficiencies. Statistically, there was no significant relationship between physical activity and insufficient intake of micronutrient conditions in adolescents at the Youth Posyandu in Pariaman City with p = 0.438.

It is because physical activity is one factor that influences energy consumption (Adityawarman, 2007). Activity, base metabolism, and higher demands to support the fast growth and development of adolescents affect adolescents' energy needs. Accelerated growth in adolescents is extremely susceptible to energy and nutrient deficiencies, such

that continuous energy and nutrient deficiencies during this period can result in delayed puberty and growth retardation (Idai.or.id, 2013).

There were 27 adolescents (31.4%) at the Youth Posyandu in Pariaman City who experienced micronutrient deficiencies, of which 23 of them were adolescents who had sufficient physical activity with pal > 1.70. Meanwhile, there were 59 adolescents (68.6%) who did not experience micronutrient deficiencies, of which 46 of them were also adolescents who had sufficient physical activity with pal > 1.70. It indicates that the energy use of each type of activity differs depending on the type, duration, and weight of the person doing the activity. The more strenuous the activity, the longer the time and the heavier the person doing it, the more energy is expended, resulting in increased energy requirements (Adityawarman, 2007).

According to data at the Youth Posyandu in Pariaman City, the most common physical activities performed by adolescents are school, light sports, and home duties. In general, the majority of the subjects' activities throughout school days and holidays were light activities. Reading, typing, conversing, and watching television are among light activities that many engage in while seated. In contrast, the subject rarely engages in intermediate or demanding activities. Typical moderate activities performed by the topic include washing and ironing, as well as sweeping and cleaning the house. Among the physically demanding activities performed include jogging, football (for male subjects), and other sports.

Utami et al. (2016) conducted research on Junior High School of Muhammadiyah 5 Surabaya. Based on the results, most of the respondents had normal nutritional status. It is due to a number of factors, including diet and physical exercise. The proportion between food intake and physical exercise will result in a healthy nutritional status. It indicated that the respondent engaged in a suitable degree of activity (not really too light nor too heavy) and has a normal nutritional status. It is in line with the concept of balanced diet, which holds that adequate physical activity and appropriate body weight should be maintained.

Effect of Socioeconomic on Insufficient intake of micronutrient Condition

As shown in Table 3, it can be stated that there are 30 adolescents who have poor family socioeconomic conditions (<1,990,170) where there are 22 adolescents (73.3%) who experienced micronutrient deficiencies with OR = 28.05. While, there are 56 adolescents who had sufficient family socioeconomic conditions (> 1,990,170) where 5 adolescents (8.9%) experienced micronutrient deficiencies. From all the adolescents studied, 51 adolescents (91.1%) had no insufficient intake of micronutrient conditions with sufficient family socioeconomic conditions (> 1,990,170). Statistically, there is a significant relationship between physical activity and insufficient intake of micronutrient conditions in adolescents at the Youth Posyandu in Pariaman City with p = 0.000.

According to Hasdianah et al. (2014), another factor that can alter a person's nutritional status is the family's purchasing ability. The majority of adolescents at the Youth Posyandu in Pariaman City have a moderate socioeconomic status (> 1,990,170). It is evident from the income of adolescents' parents. The purchase ability of food is affected by the family's income so that the family can meet its food needs. Food availability at the household level is dependent on the production and delivery of food from producers to households in sufficient amounts. However, despite the family's ability to offer goods and appropriate purchasing power, a lack of understanding may prevent the family from providing a daily variety of cuisines. In turn, inadequate dietary intake results in an aberrant nutritional status.

Beginning with the degree of education, which affects the type of work, socioeconomic factors can influence nutritional status. Then, the type of employment will influence income. Low income prevents families from satisfying the dietary needs of all family members in terms of both quality and quantity. Low income causes food spending to be restricted (Adriani & Wirjatmadi, 2014).

5 CONCLUSION

The results showed that 1) gender, age, and physical activity had no effect on the prevalence of micronutrient deficiencies among adolescents. 2) socioeconomic influenced adolescent insufficient intake of micronutrient conditions.

Furthermore, the suggestion provided to the Youth Posyandu in Pariaman City as an Posyandu which pays attention to the health conditions of adolescents is that they should intervene with adolescents to regulate their diet and physical activity as a preventative measure for adolescents experiencing micronutrient deficiencies, specifically by reducing daily food intake. Calorie-dense and lacking in micronutrients checking Hb levels in the

body is necessary for the collection of significant data.

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