MENU FOR RECOVERY ADOLESCENT GIRLS WITH ANEMIA

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ABSTRACT

Anemia is affected by eating pattern and food intake. The necessity of recovery adolescent girls with anemia menu is urgent because of the high incidence of anemia on adolescent girls. The objective of this study is to arrange recovery menu for adolescent girls with anemia. This study formulate 11 menu for 11 days. Each menu consists of breakfast, morning snack, lunch, afternoon snack and dinner. After being formulated, the macro and micronutrient content in the menu each day were analyzed.

The result showed that the menu whose ingredients is beef contained high number of Fe substance, Folate, and vitamin B12. Menu made of vegetable and snack that in the form of fruit juices contained high number of vitamin C that is needed to absorb Fe substances. The menu use rice as the main source of carbohydrate. The meal menu is the combination of rice, vegetable anf fruit that contains high number of vitamin C.

Key Word : Anemia, adolescents girl, menu, food

INTRODUCTION

Adolescents as the successor or nation's generation is a precious human resource asset who can indirectly improve economy level of the community and nation. The impact of iron deficiency anemia is that it weakens red blood cell's synthesis process, where red blood cells are needed to deliver oxygen throughout the body. Other than disturbing red blood cell's synthesis process, anemia also inhibit cognitive and physical growth of adolescents (Stoltzfus, 2021). Adolescents in USA with iron deficiency anemia has twice the risk of getting mathematical score under average compared to those without anemia, however, there is no verbal competence difference between those two groups. One study revealed that there is an association between haemoglobin concentration and child intellectual intelligence, in which the higher the haemoglobin level, the higher the intelligence is with determinant coefficient of 24,1% (Kusmiyati *et al.,* 2023). Ministry of Health (2010) also stated that adolescent girls with anemia are malnutrition, or often becoming ill, easier to feel scared or angry compared to healthy female adolescents. WHO and UNICEF (2001) reported there are 40 – 50% children with anemia, partly caused by iron deficiency. Prevalence of anemia in adolescents with the age of 12 – 16 in Turkey, reached 5,9% where 59% of it is caused by iron deficiency, meanwhile

the rest 41% is caused by deficiency of both iron and vitamin B12 (Balc, 2018). Research in Malaysia revealed that there are 85% adolescents with iron deficiency with 98% of them do not have enough iron supply from food to fulfill the requirement (Foo *et al.* 2018).

Data from Indonesia Basic Health Research (Ministry of Health, 2013) showed that adolescents with anemia consists of 12,4% male adolescents and 22,7% female adolescents with higher incidence in rural area than urban region. Indonesia Basic Health Research (2017) found that the occurrence of anemia on children is 9,8% where one of the five highest provinces with anemia sufferers is Jakarta. A study in Indonesia done by Tandirerung *et al.* (2023) revealed that 10.8% of young adolescents suffer from anemia. Rahayu et. al. (2018) found that there are only 8.75% adolescents with enough iron intake whereas there are 26,25%, who do not have enough iron supplementation. One cause of anemia in adolescent girls is dietary habit and food intake. Suryani *et al.* (2018) stated that there are more adolescents girls with bad dietary habit (48%) suffer from anemia than those with good dietary habit (38%). According to Ministry of Health (2020), adolescents girls require food that is rich in iron to protect their physical and mental ability and prevent anemia. The best source of iron is originated from animals like liver, fat free meat, and fish. Another source of iron include food. Adolescent girls who have anemia will benefit from blood (iron) supplement tablets weekly consumption. This supplement is needed to store iron in the body. Moreover, dietary menu with high iron content and high iron absorption rate is also needed to support anemia recovery.

DKI Jakarta is one of the provinces with high incidence of anemia on adolescents, especially girls. Anemia is influenced by dietary habit and the intake of animal protein source food with high iron content. The necessity of dietary menu design for anemia recovery on adolescent girls is deeply urgent since iron supplementation only provides short term solution, while nutritional education and provision of dietary menu that lead to development of dietary habit will have long-term impact.

METODHOLOGY

Menu design is started by deciding the length of menu cycle and the duration the menu will be used. Following that, establishment of portion, menu evaluation, and menu revision are determined. The menu is made for 10 plus one days. It included breakfast, morning snack, lunch, afternoon snack, and dinner. Food ingredients that are considered as to have high animal protein, iron, and vitamin C content are used in the menu design. The formulation of the menu is referred to macro and micro nutrient requirement for adolescents girl at the age of 15 – 18. Menu design arrangement and nutrient content calculation were done in Nutrition Laboratory

at Health Sicences Faculty of UHAMKA. After the formulation of dietary menu for 10 days plus 1 was finished, analysis of macro and micro nutrient content was done. Following this, non hierarchical cluster analysis was done to evaluate the menu that does not suit 15-to-18-year-old adolescent girls' nutrition requirement and adequacy. The menu's serving size was then adjusted.

RESULT

The eleven-day-menu comprises breakfast, morning snack, lunch, afternoon snack, and dinner each day. Those are explained in the following tables.

a) First Menu

Table 1. The First Menu for the Recovery of Adolescent Girls with Anemia

Breakfast	Morning Snack	Lunch	Afternoon Snack	Dinner
Sandwich Full Cream Milk	Chocolate Donut	Rice Vegetable Soup Fried Chicken Watermelon Ambon Banana	Vegetable Filled Rissole	Rice Fish Nugget Chinese Cabbage Sauté Dragon Fruit

The first menu for breakfast day 1 consists of sandwich and full cream milk. Rice, vegetable soup, fried chicken, watermelon, and Ambon banana are for lunch in this menu. For dinner, four dishes constitute the menu, namely rice, fish nugget, Chinese cabbage sauté, and dragon fruit.

b) Second Menu

Table 2. The Second Menu for the Recovery of Adolescent Girls with Anemia

Breakfast	Morning Snack	Lunch	Afternoon Snack	Dinner
Chicken Porridge Full Cream Milk	Mungbean Porridge	Rice Marinated Fried Meat *Sayur Bening* Watermelon	Pastel	Rice *Fu Yung Hai* Stir Fried *Kangkung* Orange

For breakfast, as in table 2, the menu consist of chicken porridge and full cream milk. The lunch menu has rice, marinated fried meat, *sayur bening* (stewed green vegetables), and watermelon as the dishes. The menu for dinner consist of rice, *fu yung hai* (meat filled omelette with gravy), stir fried *kangkung* (water spinach), and orange.

c) Third Menu

Table 3. The Third Menu for the Recovery of Adolescent Girls with Anemia

Breakfast	Morning Snack	Lunch	Afternoon Snack	Dinner
Nasi Uduk	Chocolate Meatbun	Rice	Milk Pudding	Rice
Shredded Omelette		*Balado* (chilli Flavour) Mackerel		Soy Sauce Grilled Chicken
Scramble Carrots and Cabbage		Stir Fried Sprout Bean and Long Bean		Bok Choy Sauté
		Soursop Juice		Ambon Banana

The third menu for breakfast comprises three kind of dishes, namely *nasi uduk* (rice cooked with coconut milk), shredded omelette, and scramble carrots and cabbage. The menu has rice, *balado* (chilli flavour) mackerel, stir fried sprout and long bean, and soursop juice for lunch. Table 3 shows rice, soy sauce grilled chicken, bok choy sauté, and Ambon banana as the dinner menu.

d) Fourth Menu

Table 4. The Fourth Menu for the Recovery of Adolescent Girls with Anemia

Breakfast	Morning Snack	Lunch	Afternoon Snack	Dinner
Fried Noodle	snack made of rice flour	Rice	Croquette	Rice
Cucumber		*Sambal Goreng Ati*		Meat Ball Soup
Omelette		Stir Fried Chayote		Red Apple
		Guava Juice		

The fourth breakfast menu are fried noodle, cucumber, and omelette. While for lunch, it has rice, *sambal goreng ati kentang* (liver and potato sautéd in fried grounded chili), stir fried chayote, and guava juice. For dinner, the dishes are rice, meat ball soup, and red apple.

e) Fifth Menu

Table 5. The Fifth Menu for the Recovery of Adolescent Girls with Anemia

Breakfast	Morning Snack	Lunch	Afternoon Snack	Dinner
Lontong Sayur	*Nagasari* (Snack from rice flour filled with banana)	Rice	Steamed Chocolate Brownies	Rice
Full Cream Milk		Fried *Jambal*		Quail Egg Sate
		Tamarind Vegetable Soup		Stir Fried Mushroom Kailan
		Melon		Mango Juice

Menu in the fifth day consists of *lontong sayur* (dishes made of chayote in coconut milk soup eaten with rice cake), and full cream milk. For lunch, it has 4 dishes, those are rice, fried *jambal,* tamarind vegetable soup, and melon. Meanwhile, the dinner dishes are rice, quail egg sate, stir fried mushroom kailan, and mango juice.

f) Sixth Menu

The sixth menu for breakfast is comprising three kinds, namely rice, *soto betawi* (a type of soup made of beef with coconut milk broth), and *emping* (chip made of *Gnetum gnemon* seed). For lunch, the menu consist of rice, *ayam rica-rica* (spicy Manado chicken), *cah putren cabe ijo* (baby corn sauté with green chili) and watermelon. For dinner there are four kinds of dishes, they are rice, fried pomfret with soy sauce *sambal*, *plecing kangkung* (water spinach with *sambal*), and pear.

Table 6. The Sixth Menu for the Recovery of Adolescent Girls with Anemia

Breakfast	Morning Snack	Lunch	Afternoon Snack	Dinner
Rice	*Lemper Ayam* (snack from glutinous rice filled with chicken)	Rice	*Cendhol* Ice (Drink made from coconut milk amd rice flour)	Rice
Soto Betawi		*Ayam Rica-Rica*		Fried pomfret with soy sauce *sambal*
Emping		*Cah Putren Cabe Ijo*		*Plecing Kangkung*
		Watermelon		Pear

g) Seventh Menu

Table 7. The Seventh Menu for the Recovery of Adolescent Girls with Anemia

Breakfast	Morning Snack	Lunch	Afternoon Snack	Dinner
Yellow Rice	*Kue Lapis Beras* (Sticky Rice Layer Cake)	Rice	Eclairs with Fla Filling	Rice
Sliced Omelette		Beef *Kalio*		*Cumi Mentega*
Beef Floss		Cassava Leaves Sauté with Anchovy		*Capcay*
Pickles				Papaya

Menu for breakfast in the seventh day are yellow rice, sliced omelette, beef floss, and pickles. For lunch, it comprises rice, beef *kalio*, and cassava leaves sauté with anchovy. For dinner the menu consist of rice, *cumi mentega* (calamari cooked with butter), *capcay* (mixed vegetables sauté), and papaya.

h) Eighth Menu

Menu at day eight for breakfast are yellow rice, egg, beef floss, and cucumber. For lunch, it is made up by rice, *kimlo* soup, yellow seasoned grilled chicken, and soursop juice. Dinner menu for the eighth day are rice, floured fried tuna with sweet and sour sauce, cucumber and shredded carrots sauté, and dragon fruit.

Table 8. The Eighth Menu for the Recovery of Adolescent Girl with Anemia

Breakfast	Morning Snack	Lunch	Afternoon Snack	Dinner
Yellow Rice	*Klepon* (snack made of glutinous rice flour with melted palm sugar filling)	Rice	*Sosis Solo* (meat filled crepe)	Rice
Egg		*Kimlo* Soup		Floured Fried Tuna With Sweet and Sour Sauce
Beef Floss		Yellow Seasoned Grilled Chicken		Cucumber and Shredded Carrots Sauté
Cucumber		Soursop Juice		Dragon Fruit

i) Ninth Menu

Table 9. The Ninth Menu for the Recovery of Adolescent Girl with Anemia

Breakfast	Morning Snack	Lunch	Afternoon Snack	Dinner
Fried Rice Vermicelli	*Arem-arem* (made of rice filled by beef or chicken)	Roasted Potato	*Es Pisang Ijo* (dessert containing milk-syrup-ice and green flour dough wrapped banana)	Rice
Fried Chicken		Omelette Vegetable Salad Watermelon		Beef *Rawon* Red Apple

There are two dishes for breakfast in the ninth menu, namely fried rice vermicelli and fried chicken. For lunch the menu comprises 4 kinds of dishes. They are roasted potato, omelette, vegetable salad, and watermelon. Dinner menu consists of 3 dishes, those are rice, meat *rawon* (meat soup with black broth), and red apple.

j) Tenth Menu

Table 10. The Tenth Menu for the Recovery of Adolescent Girl with Anemia

Breakfast	Morning Snack	Lunch	Afternoon Snack	Dinner
Grilled rice (filled with stir fried snapper and broccoli)	*Lapis* (layer cake) Surabaya	Rice	Sweet fla cup cake	Rice
		Semur Ati Ampela Stir Fried Carrot and Green Bean Guava Juice		*Opor Ayam* Stir Fried Chayote Papaya

As shown in table 10, breakfast menu for day ten is only one dish that is grilled rice (filled with stir fried snapper and broccoli). For lunch, there are 4 kind of dishes, namely rice, *semur ati ampela* (stewed liver and gizzard), stir fried carrot and green bean, and guava juice. Menu for dinner consists of rice, *opor ayam* (chicken cooked by coconut milk), stir fried chayote, and papaya.

k) Eleventh Menu

The last day menu consist of beef fried rice and cucumber, for breakfast. The lunch menu for the eleventh day are *aglio-olio* spaghetti, vegetable and chicken soup, and orange. For dinner, the dishes in the menu are rice, chicken cordon blue, mushroom and sweet corn sauté, and pear.

Table 11. The Eleventh Menu for the Recovery of Adolescent Girl with Anemia

Breakfast	**Morning Snack**	**Lunch**	**Afternoon Snack**	**Dinner**
Beef Fried Rice	*Bugis* snack (made of glutinous rice flour with sweetened shredded coconut filling)	*Aglio-olio* Spaghetti	Fried meat-tofu	Rice
Cucumber		Vegetable And Chicken Soup		Chicken Cordon Blue
		Orange		Mushroom and Sweet Corn Sauté
				Pear

Eleven-day-menu is arranged along with their type of ingredient and the portion. It is then analyzed based on one meal portion. The dishes made in the menu is adjusted to the preferences of the adolescents, such as spaghetti, meatball, etc. The following tables show the calculation of macro nutrient content.

Table 12. Analysis of Macro Nutritional Adequacy and Content in the Menu

Age	Energy	Carbohydrate	Protein	Fat
16 – 18	2400	330	62.5	80
Menu 1	2932.34	343.716	132.595	132.595
Menu 2	2493.7	257.5	129.9	110.4
Menu 3	1918.5	551.187	57.6	76.8
Menu 4	5013.7	194.3	190.496	173.503
Menu 5	1237.5	256.1	59.3	26
Menu 6	1743.1	27.8	91.4	65.7
Menu 7	1792.6	296.33	49.7	32.5
Menu 8	1398.2	343.716	70.8	51.4
Menu 9	1817.8	240.60	77.68	75.47
Menu 10	1689.5	320.4	64.00	69.90
Menu 11	2891.9	161.4	182.8	151.5

Table 13. Analysis of Micro Nutritional Adequacy and Content in the Menu

Age	Vit A	Vit C	Calcium	Fe	Phosphor	Vit B12	Zn	Folate	Fiber
16 – 18	600	82.5	1200	20.5	1200	2.4	15.5	400	33.5
Menu 1	4370.95	29.825	454.21	73.816	982.8	4.2	6.1	145.2	12.09
Menu 2	2776.3	80.3	615.2	12.9	1402.7	7.3	18.8	296.6	11.9
Menu 3	2212.5	177.3	298.5	8.8	970.3	1.8	4.5	212.7	18.7
Menu 4	14362	294.6	329.7	39.121	2166.8	30.2	24.1	466.6	31.5
Menu 5	661.6	81.3	288	8.3	773.1	5.5	5.5	168.9	10.2
Menu 6	1031.7	103.4	571.4	11.8	843.5	2.4	4.4	273.6	13.3
Menu 7	1661.2	162.5	828.6	5.9	876.8	5.2	7.7	201	6
Menu 8	3767.9	52.9	100.9	6.4	716.9	2.3	29.6	71.2	7.7
Menu 9	429.95	60.23	331.23	14.02	684.9	1	4.30	62.60	11.57
Menu 10	10.327.5	507	334.60	14.70	665.2	42.6	7.60	722.	23.10
Menu 11	1099.9	99.6	806.9	19.1	1139.3	3.5	9.6	147.4	7.5

Table 12 demonstrates that the menu with the highest energy content is the first, menu, followed by the eleventh and second menu. The third menu has highest carbohydrate content among all menu. The fourth and first menu contain highest protein content. The highest fat content is showed in the menu number 4. In table 13, it is shown that the highest iron content is in the first menu, while the biggest amount of folate is in the fourth menu.

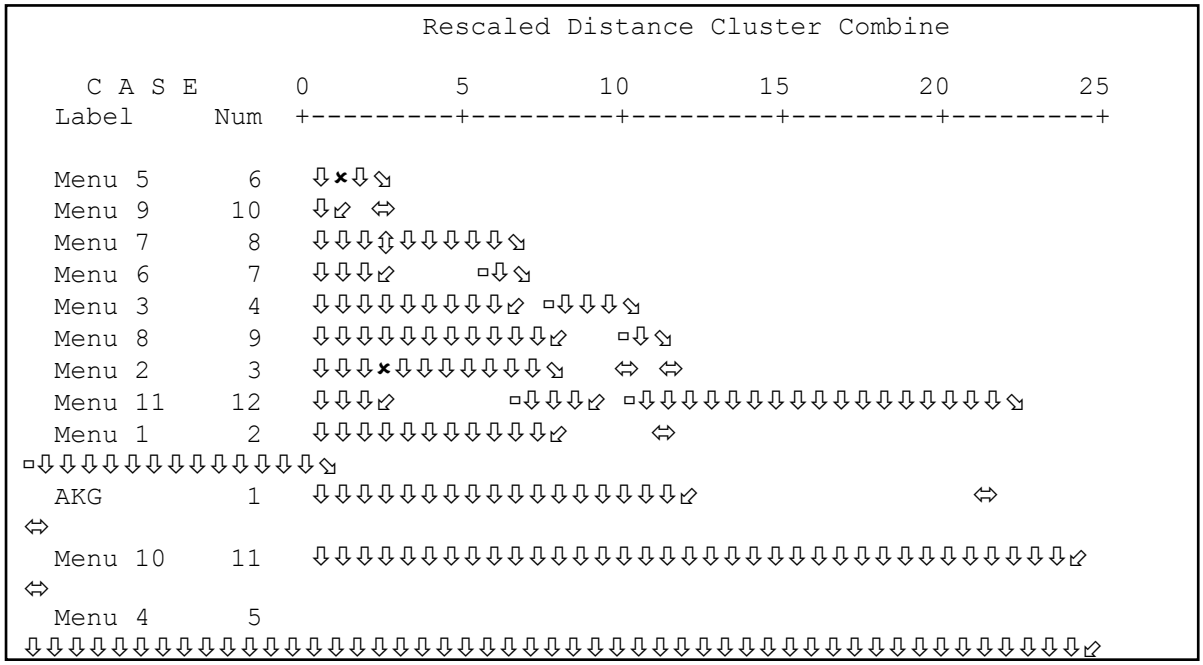
Table 14. The Result of Nutrient Content Cluster in Menu for Adolescent Girls Recovery

Group	4 Cluster	3 Cluster	2 Cluster
AKG	1	1	1
Menu 1	2	1	1
Menu 2	2	1	1
Menu 3	2	1	1
Menu 4	3	2	2
Menu 5	2	1	1
Menu 6	2	1	1
Menu 7	2	1	1
Menu 8	2	1	1
Menu 9	2	1	1
Menu 10	4	3	1
Menu 11	2	1	1

In table 14, it can be seen that the 4^{th} and 10^{th} menu are menu that far diverge from adolescents girls' recommended dietary allowance (RDA). Dendrogram demonstrates that if there are 4 clusters formed, then the menu doesn't have the same content as the DRA. However,

if the clusters formed are only three or 2 clusters, then the menu is containing almost the same nutrient as in the RDA.

Figure 1. Dendrogram Based on Micro and Macro Nutrient Content



DISCUSSION

Health Department (2020) suggests that the recommended menu for anemia adolescent girls, aged 13-15, should contain 2350 kcal energy, 57 g protein, 65 mg vitamin C, and 26 mg Fe. Meanwhile, the menu for adolescent girls with anemia, aged 16-18, should contain 2.200 kcal energy, 50 g protein, 75 mg vitamin C, and 26 mg Fe. The menu given for the recovery of adolescent girls with anemia consist of food source of iron such as chicken and beef liver, egg yolk, and fruits with adequate vitamin C content. The recommended vegetables and beans are cassava leaves, spinach, red bean, and asparagus.

Alaofè *et al*. (2019) investigated the menu in school for the recovery of adolescent girls. The breakfast menu always consists of corn pap, bread and milk, Chinese cabbage, and sugar that contain 1.90 mg iron with the absorption of 1.86 mg. The menu for lunch consists of rice with bean (*Atassi*), sardines, fried mackerel, or meat that are usually eaten with tomato sauce, or served with spicy rice (rice cooked with tomato paste). The most common dishes are bean with cassava flour (*gari*), spicy corn paste (*amiwo*) with tomato sauce, and poultry, spicy spaghetti with fried mackerel or beef. The dinner menu often consists of corn bread (*wo, akassa*) with sauce or vegetable (okra, spinach) and fried mackerel, while rice is served with tomato

sauce and sardines, or fried mackerel. Another result showed food containing iron (beef, liver, poultry, and lentils) and food that can enhance non-heme iron (fish and fruits), whereas coffee is known to inhibit non-heme iron absorption, soaking dried beans will reduce phytate content, and decreasing water and cooking period will avoid vitamin C destruction. Adolescent girls lose 0.7 iron through feces, 0.2-0.5 through urine and sweat. The requirement of iron at the time of menstruation is 1.4, and 0.5-1.0 is for growth. The total requirement of iron is 1.9-3.7. The requirement of menu is 3-10 times from the total.

CONCLUSION

There are 11 menu planned for anemia recovery in adolescent girls, including breakfast, morning snack, lunch, afternoon snack, and dinner. The menu that include high protein and iron (Fe) content are the 1st and 4th menu. Mineral content related to anemia, which are folic acid and vitamin B12 are also found highest in the 4th menu. However, menu number 4 is far from the Recommended Dietary Allowance (RDA) for adolescent girls.

RECOMMENDATION

The effort to create dietary menu for anemic adolescent girls should follow the taste and appetite of adolescents, as well as being varied enough. High content of iron (Fe), vitamin C, vitamin B12, and folic acid will help adolescent girls recover from anemia.

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