
RISK OF BACK PAIN IN MEDICAL FACULTY UNIVERSITAS PEMBANGUNAN NASIONAL VETERAN JAKARTA STUDENTS DURING ONLINE LECTURES IN THE 2020 COVID-19 PANDEMIC ERA

Dwi Arwandi Yogi Saputra^{1*}, Hermawan Saputra¹, Sutoto¹

^{1*}Fakultas Ilmu Kesehatan Masyarakat, Universitas Prof Dr. Hamka, Indonesia

*Correspondence email: Dwiarwandi.yogisaputraa@gmail.com

ABSTRACT

Online learning is learning that is done face-to-face but through available platforms. All forms of learning materials are distributed *online*. Communication is done *online*, and tests are also conducted *online*. During the Covid-19 pandemic, distance learning using devices such as laptops and *smartphones* is very much needed to support distance learning activities. This impacts increasing the risks that arise, such as back pain. To determine the risk of pain in students of the Faculty of Medicine, Universitas Pembangunan Nasional VETERAN Jakarta, during online lectures in the era of the Covid-19 pandemic in 2021. This type of research uses a quantitative method with an Analytical Descriptive Design Model with a *Cross-Sectional* and logistic regression analysis to analyze Pain Risk Back as a Student of the Faculty of Medicine, Universitas Pembangunan Nasional VETERAN Jakarta, During Online Lectures in the Era of the Covid-19 Pandemic. Of the student who had a risk of back pain, 159 (74.6%) and 54 (25.4%) had no back pain. Variables that have a significant relationship with the risk of back pain in Medical Faculty Universitas Pembangunan Nasional VETERANs Jakarta Students During Online Lectures in the Era of the Covid-19 Pandemic are gender (P=0.004), BMI (P=0.002), device (P=0.000), position sitting (P=0.000) and length of sitting (P=0.003). The dominant variables in this study were Device (P= 0.000), length of sitting (P= 0.000), sitting position (P= 0.026), and BMI (P= 0.036). Risk factors for Back Pain as a Student of the Faculty of Medicine, Universitas Pembangunan Nasional VETERAN Jakarta, During Online Lectures in the Era of the Covid-19 Pandemic, Old Devices, Sitting Position, and BMI with R squared value of 0,381

Keywords: Back Pain Risk, Online Learning, Covid-19 Pandemic

INTRODUCTION

In December late 2019, the WHO China Country Office reported a case of pneumonia of unknown etiology in Wuhan City, Hubei Province, China. In January, the pneumonia case was caused by SARS-CoV-2, and the disease was called COVID-19. SARS-CoV-2 is also known to cause Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS). The Covid-19 outbreak, which originated in the city of Wuhan, is spreading very quickly every day and extending outside the RRC, so the WHO has declared it a global pandemic. Until now, no suitable cure has been found for THIS COVID-19. Researchers around the world are also continuing to seek a series of

vaccine test tests to reduce the spread of COVID-19, but as of early April, no right vaccine has been found to counteract it. The thing that the community can do is to prevent it from becoming ill so that it becomes a source of transmission. It is expected to break the chain of transmission. Covid-19 can be transmitted to other people from people who have been indicated by Covid-19 through splashes from the nose or mouth. The spark can enter directly into other people or pass through the surface of nearby objects. People touch these objects and then touch areas that are easily exposed to the virus, such as the nose, mouth, and eyes. This is a dangerous infectious disease.

The number of new cases globally reported last week (19-25 July 2021) was more than 3.8 million, with a percentage increase of 8%¹. The first case indicated positive for COVID-19 for the first time in Indonesia was found in Depok by two people on March 2, 2020. The nature of the spread was so fast that until December 9, 2020, 592,900 people were reported positive for COVID-19, 487,445 people recovered, and 18,171 people died.² Based on data published by WHO Indonesia on the current Covid-19 Situation, as of December 9, 2020, the results of the cumulative number of Covid-19 events, Java Island still ranks first with a percentage of 60% (361,041) cases³ And DKI Jakarta ranks first based on data compiled by the Covid-19 Task Force as of December 13, 2020, with a percentage of 152,499 (24.7%)⁴ Circular Letter of the Minister of Education and Culture Number 36962 / MPK. A/ HK / 2020 explained that every teaching and learning process in each university's schools and campuses uses online methods to prevent the development and spread of Coronavirus disease (Covid-19)⁵. The Ministry of Education and Culture through the Circular Letter of the Director General of Higher Education of the Ministry of Education and Culture of the Republic of Indonesia No.1 of 2020 concerning the Prevention of the Spread of Coronavirus Disease (Covid-19) in Higher Education, the Ministry of Education and Culture stated to organize distance learning following the conditions of their respective universities and advised students to do learning from home⁶

Online learning is learning that is carried out without doing face-to-face but through the available platforms. All forms of learning materials are distributed online. Communication is carried out online, and tests are also carried out online. Online learning requires students to study independently at home for quantitative and qualitative courses. As many as 64% of the types of classes held are quantitative or calculating. The duration of the lecture is carried out the same as the lecture in the classroom, which is 2.5-3 hours for one

course⁷. Based on a preliminary study conducted on respondents at the Faculty of Medicine Universitas Pembangunan Nasional VETERAN Jakarta, as many as 131 students were carried out using a Google Form consisting of Students of the Undergraduate Medical Study Program level 1, 2 to 3 who are still active in distance learning activities and are still at the pre-clinical level. Students of the Faculty of Medicine Universitas Pembangunan Nasional VETERAN Jakarta carry out distance learning which is carried out every day with an average number of study hours > 6 hours in one day. As many as 91.7% of students experience fatigue when using Laptops / Smartphones during distance learning. Students of the Faculty of Medicine Universitas Pembangunan Nasional VETERAN Jakarta experience pain during distance learning activities of 86.7%, with a percentage of 80% of students experiencing pain in the eyes, 73.3% of students experiencing back pain, 60% of students experiencing pain in the neck, and 52.5% experiencing pain in the waist. In the preliminary study, it was also known that students experienced pain in the back area 81.4%, and 67.2% of students experienced pain in the Lower Back Area. As well as a preliminary study conducted at a state university in Jakarta, namely Syarif Hidayatullah State Islamic University Jakarta, found that 78.3% experienced pain during Online Learning and experienced back pain. During the Covid-19 pandemic, distance learning using devices such as laptops and smartphones is needed to support distance learning activities. This impact increases the risks that arise, such as Back Pain. According to research conducted in various primary schools in Iran, about 86% of students experience musculoskeletal risk, with an incidence rate of shoulder pain of 70% and pain in the lower back of 8.7%⁸. Data for the prevalence of back pain sufferers are not known for sure in Indonesia. Based on a multicenter study conducted by the PERDOSSI (Association of Neurologists throughout Indonesia) pain study group in May 2002 in 14 teaching hospitals in

Indonesia, it shows that the number of pain sufferers is 4456 people (25% of total visits) of which 1598 people (35.86%) were headache sufferers and 819 people (18.37%) were low back pain sufferers⁹

MATERIAL AND METHODS

This type of research uses quantitative methods with analytical descriptive design models with a Cross-Sectional approach to analyze back pain risk as the primary data in this study. The sampling technique with Proportionate Stratified Random Sampling is carried out by collecting data on the number of students from each level consisting of students of levels I, II, and III, which then determines the number of samples needed for each level.

Based on the calculation above results, the minimum number of samples studied is 213 respondents based on the level to be studied. The calculation of the proportion of samples is carried out in the following ways: Level 1 students as many as 74, Level 2 as many as 68, and Level 3 as many as 71. The data used at the time of the study were as follows. The data collection in this study was in the form of primary data, namely data from respondents' answers using the Numeric Rating Scale (NRS) questionnaire through a google form. The Numerical Rating Scale (NRS) is one of the measuring instruments to assess the level of pain experienced by patients according to the subjectivity of the respondent. The method is that respondents are asked to rate their pain according to the level of pain intensity on the numerical scale from 0-10 or 0-100. 0 means "no pain," and 10 or 100 means "serve pain." Research instruments are all tools used to collect, examine, investigate a problem, process, analyze and present data systematically and objectively to solve a problem or test hypotheses. The questionnaire used adopted and modified several questionnaires in the research of Lilis Kurnia Rahayu¹⁰, Ananda Puspitasari¹¹, and Ghina Widiasih¹² using a Google Form which was disseminated to students using the link that had been prepared. Research instruments are used to measure the

value of the variable under study. The analysis used multivariate analysis to determine the relationship between various variables of sitting position, length of sitting, and characteristics that include age, gender, and body mass index. Follow-up in data processing, researchers carry out data input processes; this technique is carried out using SPSS for Windows with multivariate analysis techniques. Researchers enter or transfer data from the questionnaire from the google form that has been provided via the link. The data is analyzed statistically using Chi-Square and presented in the form of tables and graphs.

RESULT

An overview of the research site, In the era of the Covid-19 Pandemic, this study was conducted on students from the Faculty of Medicine Universitas Pembangunan Nasional VETERAN Jakarta. On pupils from the classes of 2018, 2019, and 2020, the study was performed. In this study, 213 respondents—213 men and women—were divided based on the use of technology during online lectures during the COVID-19 epidemic. The questionnaire uses a g-form filled out directly by the respondent.

UNIVARIATE RESULTS

Table 1. Distribution of Pain Risk Frequency to Medical Faculty Universitas Pembangunan Nasional Veteran Jakarta

Variable	Frequency (n= 213)	Percentage (%)
Gender		
Female	126	59.2
Male	87	40.8
BMI		
Obesity	106	59.2
No Obesity	107	40.8
Device		
Laptop	78	36.6
Smartphone	135	63.4
Long Sitting		
>8 Hours	127	59.6
≤ 8 Hours	86	40.4
Sitting Position		
Not Quite Right	126	59.2
Exactly	87	40.8
Back Pain		
Yes	159	74.6
No	54	25.4

In table 1, the distribution of pain risk among students of the Faculty of Medicine, Universitas Pembangunan Nasional VETERAN Jakarta, during online lectures in the era of the COVID-19 pandemic in 2021, from 213 respondents in this study, it is known that the gender variable for the female sample is more dominant. Namely, 126 students (59.2%) and 87 male students (40.8%). These results indicate in this study, more female than male students. In the variable Body Mass Index (BMI), students are divided into two categories, namely Obesity 106 (49.8%) and Non-Obesity 107 (50.2%). In this study, more students were not obese, with no significant difference. In the device variable from 213 respondents, 78 (36.6%) students use laptops, and 135 (63.4%) students use smartphones. The results of this study indicate that students are more dominant in using smartphones when doing online learning. The variable length of sitting is divided into two categories, namely sitting position > 8 hours for 126 students (59.2%) and 8 hours for as many as 86 students (40.4%). In this study, the dominant student sitting position was > 8 hours, 59.2%. The sitting position variable is divided into two categories: the incorrect sitting position of 126 students (59.2%) and the correct position of 87 students (40.8%). In this study, the wrong sitting position was quite dominant at 59.2%. The back pain variable was divided into two categories: Yes, as many as 159 students (74.6%) and no back pain in 54 students (25.4%). In this study, the dominant students experienced back pain at 74.6%.

BIVARIATE RESULTS.

Table 2. The Relationship of Gender to the Risk of Back Pain Due to Medical Faculty Students at Universitas Pembangunan Nasional VETERAN Jakarta

GENDER	BACK PAIN				TOTAL		OR (95% CI)	p- value
	YES		NO		N	%		
	N	%	N	%				
Female	103	64.8	23	42.6	126	59.2	2.479 (1.320- 4.654)	0.004
Male	56	35.2	31	57.4	87	40.8		
Total	159	100	54	100	213	100		

The results of the analysis showed that 64.8% of female respondents complained of back pain than male respondents (35.2%). The statistical test results obtained a p-value = 0.004 ($P = <0.05$), meaning that there was a significant relationship between gender and the risk of back pain in students of the Faculty of Medicine, Universitas Pembangunan Nasional VETERAN Jakarta, during online lectures in the Covid-19 pandemic era. In the analysis results, the value of OR = 2,479, meaning that females are 2,479 times more at risk of back pain than males.

Table 3. The Relationship of Body Mass Index (BMI) to the Risk of Back Pain Due to Medical Faculty Students at UNIVERSITAS PEMBANGUNAN NASIONAL VETERAN Jakarta

BMI	BACK PAIN				TOTAL		OR (95% CI)	p- value
	YES		NO		N	%		
	N	%	N	%				
Obesity	89	56.0	17	31.5	106	49.8	2.767 (1.439- 5.322)	0.002
No Obesity	70	44.0	37	68.5	107	50.2		
Total	159	100	54	100	213	100		

The analysis showed that 56% of obese respondents complained of back pain than non-obese respondents (44%). Statistical test results obtained a p-value = 0.002 ($P = <0.05$), meaning a significant relationship exists between BMI and Back Pain Risk in Medical Faculty Universitas Pembangunan Nasional VETERAN Jakarta, students during online lectures in the era of the covid-19 pandemic. In the analysis results, the value of OR = 2.767 means That obese respondents are 2.767 times more at risk of back pain than non-obese respondents.

Table 4. The Relationship of Device to the Risk of Back Pain Due to Medical Faculty Students at Universitas Pembangunan Nasional VETERAN Jakarta

DEVICE	BACK PAIN				TOTAL		OR (95% CI)	P-value
	YES		NO		N	%		
	N	%	N	%				
Laptop	40	25.2	38	70.4	78	36.6		
Smartphone	119	74.8	16	29.6	135	63.4	0.142 (0.071-0.281)	0.000
Total	159	100	54	100	213	100		

According to the analysis's findings, respondents who use smartphones (74.8%) and laptops (25.2%) also report experiencing increased back pain. According to the results of a statistical test, the device and the risk of back pain for students at the Faculty of Medicine, Universitas Pembangunan Nasional Veteran Jakarta, during online lectures during the Covid-19 pandemic, are significantly related. The p-value for this test was 0.000 (P = 0.05). According to the test results, the odds ratio (OR) was 0.142, which indicates that students who use cell phones face a 0.142 higher risk of back pain than those who use laptops.

Table 5. The Relationship of Long Sitting to the Risk of Back Pain Due to Medical Faculty Students at Universitas Pembangunan Nasional VETERAN Jakarta

LONG SITTING	BACK PAIN				TOTAL		OR (95% CI)	P-value
	YES		NO		N	%		
	N	%	N	%				
>8 Hours	82	51.6	45	83.3	127	59.6		
≤ 8 Hours	77	48.4	9	16.7	86	40.4	0.213 (0.098-0.456)	0.000
Total	159	100	54	100	213	100		

The results of the analysis showed that respondents who had sat for more than 8 hours (51.6%) complained about back discomfort more frequently than respondents who had sat for less than 8 hours (48.4%). The results of the statistical analysis showed that there is a significant correlation between the amount of time spent sitting and the risk of developing back pain in students enrolled in the Faculty of Medicine at Universitas Pembangunan

Nasional VETERAN Jakarta during online lectures during the Covid-19 pandemic, with a p-value of 0.000 (P = 0.05) indicating this. The results of the test revealed an OR value of 0.213, meaning that students who sit for more than eight hours had a 0.213-fold increased chance of suffering from back pain.

Table 6. The Relationship of Sitting Position to the Risk of Back Pain Due to Medical Faculty Students at Universitas Pembangunan Nasional Veteran Jakarta

SITTING POSITION	BACK PAIN				TOTAL		OR (95% CI)	P-value
	YES		NO		N	%		
	N	%	N	%				
Not Quite Right	85	53.5	41	75.9	126	59.2	0.364 (0.181-0.731)	0.004
Exactly	74	46.5	13	24.1	87	40.8		
Total	159	100	54	100	213	100		

The analysis showed that respondents who sat in an inappropriate position (53.5%) complained more about back pain than respondents with the right sitting position (46.55). The statistical test results obtained a p-value = 0.004 (P = <0.05), meaning that there is a significant relationship between sitting position and the risk of back pain in students of the Faculty of Medicine, Universitas Pembangunan Nasional VETERANs Jakarta, during online lectures in the Covid-19 pandemic era. The test results obtained an OR value = 0.364, meaning that students who do not sit properly risk experiencing back pain 0.364 times.

MULTIVARIATE RESULTS.

Bivariate Selection

Table 7. Bivariate Selection

Variable	P-Value	Multivariate Candidate
Gender	0.004	Yes
BMI	0.002	Yes
Device	0.000	Yes
Long Sitting	0.000	Yes
Sitting Position	0.003	Yes

All independent variables are entered into multivariate modeling.

Modeling 1 Multivariate

Table 8. Results of Initial Modeling of Back Pain Risk Due to Smartphone Use in Medical Faculty Universitas Pembangunan Nasional VETERAN Jakarta.

Variable	P value	OR
Gender	0.564	1.254
BMI	0.040	2.259
Device	0.000	0.131
Long Sitting	0.001	0.214
Sitting Position	0.027	0.399

The results of the initial multivariate modeling show that the largest P value is the gender variable $P = 0.564$, then the gender variable is excluded from the modeling.

Modeling 2 Multivariate

Table 9. Results of Initial Modeling of Back Pain Risk Due to Smartphone Use in Medical Faculty Universitas Pembangunan Nasional VETERANs Jakarta, Students During Online Lectures in the Era of the Covid-19 Pandemic

Variable	P value	Old OR	New OR	OR . Value Change (%)
Gender	0.564	1.254	-	-
BMI	0.040	2.259	2.290	1.372
Device	0.000	0.131	0.122	-6.870
Long Sitting	0.001	0.214	0.212	-0.934
Sitting Position	0.027	0.399	0.396	-0.751

Based on the calculation of the OR value after removing the gender variable, it was found that there was no change in the OR value $> 10\%$. This means that the gender variable is not a confounding variable or a variable that affects a significant relationship with the risk of back pain. After the gender variable was excluded from the multivariate modeling, there were no more variables > 0.05 .

Multivariate Final Model

Table 10. The Results of the Final Modeling of Back Pain Risk for Students of the Faculty of Medicine, Universitas Pembangunan Nasional VETERAN Jakarta

Variabel	P value	OR	R ²
BMI	0.036	2.290	0.381
Device	0.000	0.122	
Long Sitting	0.000	0.212	
Sitting Position	0.026	0.396	

Based on the calculation of the final multivariate results, the risk factors for back pain in the students of the Faculty of Medicine Universitas Pembangunan Nasional VETERAN Jakarta during online lectures in the Covid-19 pandemic era were obtained, namely Device ($P = 0.000$), length of sitting ($P = 0.000$), sitting position ($P = 0.026$) and BMI ($P = 0.036$). Obtained R squared value of 0.381. the ability of the risk factor variable to explain the dependent variable was 38.10%, while other factors explained the additional 61.9%. These four risk factors have a significant effect on the dependent variable.

DISCUSSION

The results of the bivariate selection of the risk of back pain using Smartphones in students from five variables that entered the multivariate candidate, namely gender ($P = 0.564$), BMI ($P = 0.040$), device ($P = 0.000$), length of sitting ($P = 0.001$) and sitting position ($P = 0.027$).

After removing the Gender variable $P = 0.0564$ because it has a $P \text{ value} > 0.05$. Then the device variables ($P = 0.000$), length of sitting ($P = 0.000$), sitting position ($P = 0.026$), and BMI ($P = 0.026$) became the dominant risk factors for the risk of back pain in students during learning during the covid-19 pandemic. The gender variable is also not a confounding variable in this study.

The device was the first variable that became a risk factor for back pain in this study ($p = 0.000$; $OR = 0.122$). There are two devices in this study, namely laptops and

smartphones. There are 63.4% smartphone users and 36.6% laptop users. Using smartphones and laptops for a long duration and in an inappropriate sitting position can cause various physical problems, including back pain. At the same time, online learning has many advantages, including being more accessible and more efficient. This is in line with the results of this study, namely that there were more smartphone users during online learning, namely 135 respondents with complaints of back pain 74.8% (119).

The second variable, the dominant risk factor for back pain, is the length of sitting because it has a P value = 0.000 and OR = 0.212. The medical faculty class schedule averages 6-8 hours per day. Sitting using a laptop for 2-4 hours causes discomfort in the back area, especially the lower part. Sitting for long periods without a backrest is at risk for back pain due to more significant pressure on the intervertebral disc when sitting. The high intensity of using smartphones or laptops during online learning usually uses a sitting position that is often used and tends to be static. Previous research has shown that using laptops for 3-5 hours daily can cause neck pain. More than 5 hours cause shoulder pain and some cause back pain. Similar to smartphone use, the risk of back pain in smartphone use is due to the ergonomic position and inappropriate sitting duration

Previous research stated that the longer the use of smartphones, the higher the neck and back pain scale with a duration of 7 hours and above. The researcher assumes that the respondent's dominant sitting position has a risk of back pain because the respondent does not change position regularly and lacks physical activity. Smartphone use for more than 3-5 hours makes the viewing distance closer to the Smartphone screen than a laptop. A person facing a screen sitting upright or leaning back, hunched over, or leaning forward can cause lower back pain. The longer the body is required to work with sitting longer than 8 hours, the body will try to maintain its sitting position in these conditions.

The third variable that is a risk factor for back pain is the sitting position ($P = 0.026$; $OR = 0.396$). . Sitting position for a long time and wrong place can cause the muscles in the waist to tense up, which, if ignored can damage the surrounding soft tissue. In contrast, if the sitting position is upright, it will suppress the nerve pads by as much as 140%. For a person with a sitting position hunched over, the increase increased to 190%. This can harm the nerve pads in the spinal cord area. The fourth variable that is a risk factor for back pain is BMI $P = 0.036$; $OR = 2290$). Respondents in this study were medical students totaling 213 people. Based on the BMI of obese students with back pain, as much as 56% and not obese with back pain 44%. Someone with an obese BMI is at risk of back pain compared to someone who is not obese. Excess weight puts more pressure on the spine, which results in easy damage and danger to the spinal structure of the spine.

CONCLUSION

There were 213 respondents in this study; 159 admitted back pain, and 54 said they did not have back pain during online lectures during the Covid-19 pandemic era. There is a significant relationship between gender and the risk of back pain among students of the Faculty of Medicine, Universitas Pembangunan Nasional VETERANs Jakarta, during online lectures in the Covid-19 pandemic era, p -value = 0.004. There is a significant relationship between BMI and the risk of back pain in medical faculty Universitas Pembangunan Nasional VETERAN Jakarta, students during online lectures in the era of the Covid-19 Pandemic p -value = 0.002. There is a significant relationship between the device and the risk of back pain among students of the Faculty of Medicine, Universitas Pembangunan Nasional VETERANs Jakarta, during online lectures in the Covid-19 pandemic era, p -value = 0.000. There is a significant relationship between sitting length and the risk of back pain in students of the Faculty of Medicine, Universitas Pembangunan Nasional VETERANs Jakarta, during online

lectures in the Covid-19 pandemic era, p -value = 0.000. There is a significant relationship between sitting position and the risk of back pain in students of the Faculty of Medicine, Universitas Pembangunan Nasional VETERANs Jakarta, during online lectures in the Covid-19 pandemic era, p -value = 0.004. The dominant risk factors for the risk of back pain in students during learning from the covid-19 pandemic are Device variables ($P = 0.000$), length of sitting ($P = 0.000$), sitting position ($P = 0.026$) and BMI ($P = 0.026$). R squared of 0.381.

The COVID-19 pandemic has required students to carry out online lecture activities for the last two years. This has an impact on increasing the use of Smartphones and laptops as communication media and means of supporting online lectures. Previous studies stated that there was an increase in the use of gadgets during the COVID-19 pandemic for more than 2 hours. Along with this increase, the risk of back pain is increasing, especially for students.

The ergonomic risk of back pain in students is felt in pain, discomfort, and aches. The risk of back pain occurs due to various pressures experienced by the muscles in a certain period and repeats every day. Besides carrying out online lectures, Smartphones and laptops can also be used as media and entertainment facilities for students during a busy lecture schedule and assignments outside of lecture hours. However, the risk of back pain cannot be ignored. Modified lifestyle changes are required so that the risk of back pain is no longer felt. This can be done in simple ways, such as meeting the daily needs of body fluids, increasing physical activity such as stretching at the start of online lectures, and a balanced nutritional intake.

REFERENCES

1. World Health Organization. Weekly epidemiological update on COVID-19 - 27 July 2021. 2021.
2. World Health Organization Indonesia. Novel Coronavirus [Internet]. 2020 [cited 2021 Mar 22]. Available from: <https://www.who.int/indonesia/news/nov-el-coronavirus/qa/qa-for-public>
3. Firmansyah MI, Rahmanto F, Setiawan D. the Preparedness for the Covid-19 Pandemic Management in Indonesia. *J Adm Kesehat Indones*. 2020;8(2):188.
4. Jannah R. Tingkat Stres Mahasiswa Mengikuti Pembelajaran Daring pada Masa Pandemi Covid-19. *J Ris dan Pengabd Masy*. 2021;1(1):130–46.
5. Kemendikbud. Surat Edaran Nomor 1 Tahun 2020 Tentang Pencegahan Penyebaran COVID-19 Di Perguruan Tinggi, Kementerian Pendidikan Dan Kebudayaan. [Http://KemdikbudGoId/](http://KemdikbudGoId/) [Internet]. 2020;126(021):1–2. Available from: <http://kemdikbud.go.id/main/?lang=id>
6. Fitriyanti AP& L. Stress dan Zoom Fatigue pada Mahasiswa Selama Pembelajaran Daring. 2021;13(1):25–37. Available from: <http://journal.thamrin.ac.id/index.php/jikmht/article/view/467>
7. Iman Dianat ZJ& HA. School Bag Weight and the Occurrence of Shoulder, Hand/Wrist and Low Back Symptoms among Iranian Elementary Schoolchildren. *Heal Promot Perspect*. 2011;1(1):76–85.
8. Sanjaya F, Yuliana Y, Muliani M. Proposi dan karakteristik mahasiswa penderita nyeri punggung di Fakultas Kedokteran Universitas Udayana Tahun 2018. *Bali Anat J*. 2019;2(2):30–7.
9. Rahayu LK. Analisis Faktor Yang Berhubungan Dengan Resiko Terjadinya Low Back Pain (LBP) Pada Karyawan Di PT Kimia Farma Plant Jakarta Tahun 2016. Universitas Muhammadiyah Jakarta; 2016.
10. Puspitasari A. Hubungan Antara Perilaku Penggunaan Laptop dan Keluhan Kesehatan Akibat Penggunaan Laptop pada Mahasiswa Sarjana Reguler Fakultas Ilmu Komputer Universitas Indonesia. Universitas Indonesia; 2012.
11. Wideasih G. Hubungan Posisi Belajar Dan Lama Duduk. 2015;