Emerging Medical Science (EMS)
Available at: *https://emspub.com*

Review Article

Covıd-19 Infectıon in Students of the Faculty of Medıcal and Nursıng Dısorders Related to Posıtıve Response

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Received: 20 July 2024; **Revised:** 23 July 2024; **Accepted:** 20 Aug 2024; **Published:** 23 Aug 2024

Abstract

Background: The current COVID-19 pandemic has created several problems related to the reproductive system in women, especially menstrual disorders. Changes that occur in the cycle, volume, and duration of menstruation can raise important issues, because they are indicators of the level of decline in a woman's fertility. Changes that occur in the menstrual cycle can cause reproductive problems in women, one example is fertility disorders. Considering that research on this matter is still minimal in Indonesia, the authors intend to carry out a scientific investigation of this phenomenon, so that people can better understand the impact of COVID-19 infection on the reproductive system, especially on disorders that can arise during menstruation. ***Method:*** This study used a cross-sectional study of 198 respondents that meet the research criteria. ***Results:*** Of the 198 respondents with inclusion criteria, it was found that 75 (37.9%) female students did not experience menstrual disorders after being infected with COVID-19 while 123 (62.1%) other female students experienced menstrual disorders. With 89 (28.7%) experiencing menstrual duration disturbances, 67 (21.6%) menstrual volume disturbances, 32 (10.3%) frequency disturbances, 32 (16.16%) menstrual regularity disturbances, 44 (14.2%) menstrual cessation disorders, and 78 (25.2%) menstrual pain disorders. Based on the Chi Square test, a p value of 0.592 was obtained so that the P Value was > 0.05 and showed that there was no relationship between COVID-19 infection and menstrual disorders. ***Conclusion:*** There is no significant relationship between menstrual disorders and COVID-19 infection in UPH Faculty of Medicine and Nursing students

Keywords: COVID-19 infection, frequency, regularity, duration, flow volume and weight and menstrual pain

1.Background

The COVID-19 (Coronavirus disease 2019) pandemic has hit the world for the last 3 years. The initial spread began at the end of December 2019 in Wuhan City, Hubei Province, China. COVID-19 has brought many influences and restrictions on our daily lives.1 Many studies have been conducted to learn more about COVID-19, especially regarding the impact of infection that can be caused by the SARS-CoV-2 virus. Infection due to COVID-19 can cause several symptoms that can last for weeks to months. Infections that can be caused by the virus itself can affect several systems in the body apart from the respiratory system, namely the circulatory system, nervous system and also the reproductive system. Several studies have stated that menstrual disorders are one of the long-term symptoms of COVID-19. The menstrual cycle itself is a basic biological cycle in every woman which is controlled by endocrine, autocrine and paracrine factors. In this cycle, changes in hormone levels occur every 25 to 32 days.2 The menstrual cycle is also regulated by a complex interaction of hormones that interact with the immune system, blood vessels and coagulation. The interactions that occur can affect bleeding during menstruation and the severity of premenstrual symptoms. Based on the journal The COVID-19 Pandemic and The Menstrual Cycle: Research Gaps and Opportunities (2022), medication and vaccines given as mitigation or control measures for COVID-19 and the psychological impact arising from the pandemic can have an impact on the hypothalamus-pituitary-ovarian axis. -endometrium so that changes in the frequency, duration, regularity, and/or volume of menstruation can occur. The occurrence of infrequent menstruation is related to the hypothalamic-pituitary, while irregular menstruation can occur because the ACE2 receptors in the ovaries are affected by SARS-CoV2. The occurrence of cycle lengthening and irregular menstrual volume is related to the endometrium and can be caused by several things. The first is inflammation, hypoxia, stress, and iatrogenic. Based on the journal, the types of menstrual disorders that most often appear in someone after being infected with the virus are disturbances in their menstrual cycle and duration. In addition, based on the journal "Menstrual Changes Following COVID-19 Infection: A Cross-Sectional Study From Jordan and Iraq (2022)" menstrual disorders can also arise as an indirect effect of vitamin C, D and B6 deficiencies caused by COVID infection -19. Because vitamins play an important role both directly and indirectly in a person's menstrual cycle. Based on the journal, the percentage of women

experiencing menstrual disorders after being infected with COVID-19 is 47.2%. The percentage obtained is almost similar to the results in a research journal entitled "The Effect of COVID-19 on the Menstrual Cycle: A Systematic Review" which obtained a prevalence percentage of 46% and in the journal "Menstrual Changes after COVID-19 Infection and COVID -19 Vaccination" which has a prevalence percentage of 35.7%. All menstrual disorders that occur in someone after being infected with COVID-19 are reversible or last only temporarily. These disturbances will appear on average in the first three cycles since being infected with COVID-19 and after that they will return to normal as before being infected with the virus. 3–6. Considering that research on this matter is still minimal in Indonesia, the authors intend to carry out a scientific investigation of this phenomenon, so that people can better understand the impact of COVID-19 infection on the reproductive system, especially on disorders that can arise during period.

2. Method

The research design used an unpaired categorical comparative analytic study and a cross-sectional study design. The research was conducted by distributing questionnaires online. The research will take place in January 2023 – April 2023. The research population that will be used is all female students of the Faculty of Medicine and Nursing, Pelita Harapan University, class of 2020-2022. The research samples to be used were all preclinical students at the Faculty of Medicine and Nursing, Pelita Harapan University, class of 2020-2022 who agreed to participate in this study and met the research criteria.

The sample in this study will be selected by purposive sampling, and follow the inclusion and exclusion criteria. Calculation of the number of samples with unpaired comparative analytical calculations, based on the number of respondents in the previous study, using the formula, the number of samples needed in this study was 198 samples. The inclusion criteria for this study were active female students at the Faculty of Medicine and Nursing, Pelita Harapan University, class of 2020 – 2022, female students who had been infected with COVID-19 and were willing to take part in the study. The exclusion criteria for this study were respondents who did not answer the questionnaire completely, female students who had a history of menstrual disorders prior to experiencing COVID-19 infection, female students who smoked, female students who had a history of chronic diseases, such as epilepsy, thyroid disorders, metabolic syndrome, Pelvic Inflammatory Disease and Cushing's disease, as well as female students who have a history of reproductive diseases, such as Polycystic Ovary Syndrome (PCOS), endometriosis, and Uterine Fibroids.

Data collection used a questionnaire which was distributed online and respondents answered via the Google form. Data will be tabulated using Microsoft Excel 2019, while data analysis will be carried out using the Statistical Package for the Social Sciences (SPSS) program.

This research is a cross-sectional study. The statistical test used in this study is the chi square test. This study was planned with bivariate analysis with $p < 0.05$. Ethical approval to conduct this research will be submitted to the Ethics Committee of the Faculty of Medicine, Pelita Harapan University, Lippo Village, Karawaci, Tangerang, Banten. Respondents will be explained about the research first and then asked to choose whether they are willing to fill out a confidential questionnaire and the data will only be used for research.

3. Results

A. Description of Research Respondents

The research was carried out by distributing Google forms to UPH Faculty of Nursing and Medicine students. The number of respondents who participated in this study were 198 people.

B. Respondents Characteristic

Based on the research results, the sample characteristics are listed in table 5.1. The samples taken came from the Faculty of Nursing and Medicine, class 2020 to 2022, with the largest sample coming from the Faculty of Medicine, totalling 171 (86.3%) samples, and the 2022 class with the largest number of samples, namely 81 (40.9%). The age range of respondents ranged from 17-27 years, with 19 years old respondents being the largest sample with a total of 67 (33.8%).

Table 1 The Characteristic of the Respondence Studied

No	Characteristic	N(%)	Total
1.	**Faculty**		198
	Medicine	171 (86,3%)	
	Nursing	27 (13,7%)	
2.	**Class of**		198
	2020	55 (27,8%)	
	2021	62 (31,3%)	
	2022	81 (40,9%)	
3.	**Age**		198
	17	4 (2,02%)	
	18	55 (27,8%)	
	19	67 (33,8%)	
	20	55 (27,8%)	
	21	11 (6,06%)	
	22	1 (0,5%)	
	23	2 (1%)	
	24	0 (0%)	
	25	0 (0%)	

	26	0 (0%)	
	27	1 (0,5%)	

C. Relationship between Menstrual Disorders and COVID-19 Infection

Table 2 shows the results of data analysis on the relationship between menstrual disorders and COVID-19 infection using chi-square. There were 75 respondents to female students at the Faculty of Medicine and Nursing, Pelita Harapan University, consisting of 64 people who were infected with COVID-19 with mild symptoms and 11 people with moderate-severe symptoms who did not experience menstrual disorders after being infected with COVID-19.

Meanwhile, 123 respondents consisting of 100 people with mild COVID-19 symptoms and 23 people with moderate-severe symptoms experienced menstrual disorders after being infected with COVID-19. The test results using chi-square obtained a p value = 0.592, with an odds ratio of 1.338, a 95% confidence interval range of 0.611 – 2.931, and a risk of 57%. So it can be concluded that there is no significant relationship between menstrual disorders and COVID-19 infection

Table 2 Relationship between Menstrual Disorders and COVID-19 Infection

COVID-19 Infection	**Menstrual Disturbance**		**Total**	***P Value***	***Odds Ratio***	***95% Confidence Interval***	***Risk***
	No	Yes					
Low	64 (39%)	100 (61%)	**164 (100%)**	**0,592**	**1,338**	**0,611 - 2,931**	**57%**
Moderate-Severe	11 (32,4%)	23 (67,6%)	**34 (100%)**				
Total	**75 (37,9%)**	**123 (62,1%)**	**198 (100%)**				

D. Percentage of Types of Menstrual Disorders that Occur in Several Samples

The percentage of types of menstrual disorders that occur in several samples can be seen in table 5.3. There were 109 (55.1%) respondents who did not experience menstrual duration disturbance, while 53 (26.8%) respondents experienced a change in menstrual duration to be longer and 36 (18.2%) respondents experienced a change in menstrual duration to be shorter. 131 (66.1%) respondents did not experience changes in blood volume during menstruation, but 39 (19.7%) respondents experienced an increase and 28 (14.1%) experienced a decrease. Meanwhile, menstrual frequency disturbances were experienced by 32 (16.1%) respondents and not experienced by the other 166 (83.8%) respondents. For respondents who did not experience menstrual regularity disturbances, there were 154 (77.7%) samples and those who experienced these disturbances were 44 (22.3%) respondents. Last for. Pain during menstruation was not experienced by 120 (60.6%) respondents, and 78 (39.4%) other respondents experienced menstrual pain. In the table, there are several female students who experience only one disorder, but there are also female students who also experience two to four disorders at once after being infected with COVID-19. Female students who only experience one type of disorder will still be included in the category of respondents who experience menstrual disorders after being infected with COVID-19.

Table 3 Percentage of Types of Menstrual Duration Disturbance That Occurred in Some Sample

Type of Disturbance	**Frequency**	**%**	**Total**
Volume Disturbance			**198 (100%)**
No Changes	131	66,2%	
Increase	39	19,7%	
Decrease	28	14,1%	

Table 4 Percentage of Types of Menstrual Volume Disturbance That Occurred in Some Sample

Type of Disturbance	**Frequency**	**%**	**Total**
Regularity Disturbance			**198 (100%)**
No	154	77,8%	
Yes	44	22,2%	

Table 5 Percentage of Types of Menstrual Frequency Disturbance That Occurred in Some Sample

Type of Disturbance	**Frequency**	**%**	**Total**
Frequency Disturbance			**198 (100%)**
No	166	83,8%	
Yes	32	16,2%	

Table 6 Percentage of Types of Menstrual Regularity Disturbance That Occurred in Some Sample

Type of Disturbance	Frequency	%	Total
Pain Disturbance			**198 (100%)**
No	120	60,6%	
Yes	78	39,4%	

Table 7 Percentage of Types of Menstrual Pain Disturbance That Occurred in Some Sample

Type of Disturbance	Frequency	%	Total
Duration Disturbance			**198 (100%)**
No Changes	109	55,1%	
Become Longer	53	26,8%	
Become Shorter	36	18,2%	

The percentage of types of menstrual disorders that occur in several samples is also listed in the form of a pie chart in Figure 1. In this diagram it can be seen the percentage of female students who experience menstrual pain disorders from the total number of respondents. For those who experience menstrual duration disorders of 28.7%%. While the percentage of menstrual pain disorders is 25.2%. For regularity disorder the percentage is 14.2%. Frequency disturbance has a percentage of 10.3%. Then for volume disturbance the percentage is 21.6%.

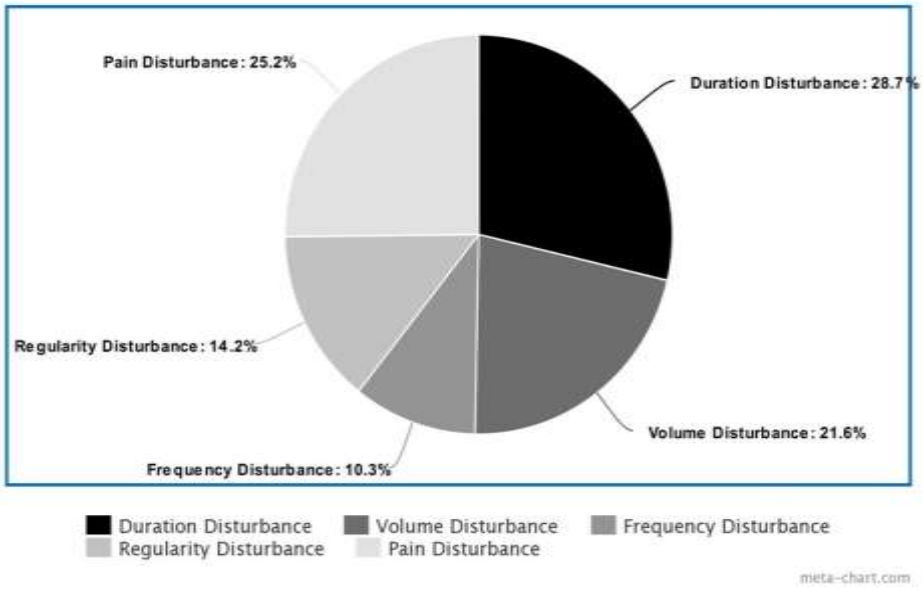

Figure 1 Percentage of Menstrual Disturbance

E. Relationship between menstrual duration disturbance and COVID-19 infection

Table 8 shows the results of the association between menstrual duration disturbance and COVID-19 infection using chi-square. The results of the analysis on 198 respondents showed that of the respondents who experienced COVID-19 infection with mild symptoms, 92 (56.1%) of them did not experience these disturbances, while 43 (26.2%) of respondents experienced disturbances in the duration of menstruation being longer and 29 (17.7%) of respondents became shorter. Meanwhile, for respondents who were infected with COVID-19 with moderate to severe symptoms, 17 (50%) respondents did not experience interference, 10 (29.4%) respondents experienced a change to become longer, and 7 (20.6%) respondents became shorter. The results of the chi-square test showed a p value with a value of 0.807 or a p value > 0.05. So it can be concluded that there is no significant relationship between menstrual duration disturbance and COVID-19 infection.

Table 8 Relationship between Menstrual Duration Disorders and COVID-19 Infection

COVID-19 Infection	Duration Disturbance			Total
	No Changes	Became Longer	Became Shorter	
Low	92 (56,1%)	43 (26,2%)	29 (17,7%)	**164 (100%)**
Moderate- Severe	17 (50%)	10 (29,4%)	7 (20,6%)	**34 (100%)**
Total	**109 (55,1%)**	**53 (26,8%)**	**36 (18,2%)**	**198 (100%)**

F.Relationship between menstrual volume disorders and COVID-19 infection

Table 9 shows the results of the association between the volume of menstrual blood loss and COVID-19 infection using chi-square. The results of the analysis on 198 respondents showed that of the respondents who had COVID-19 infection with mild symptoms, 109 (66.5%) of them did not experience the disorder, while 32 (19.5%) of the respondents experienced an increase in the amount of blood loss during menstruation and 23 (14.0%) respondents experienced a decrease in the amount of blood loss. Meanwhile, for respondents who were infected with COVID-19 with moderate to severe symptoms, 22 (64.7%) respondents did not experience interference, 7 (20.6%) respondents experienced an increase, and 5 (14.7%) respondents experienced a decrease. The results of the chi-square test showed a p value of 0.981 or a p value > 0.05. So it can be concluded that there is no significant relationship between menstrual volume disturbances and COVID-19 infection.

Table 9 Relationship Between Menstrual Volume Disorders and COVID-19 Infection

COVID-19 Infection	**Volume Disturbance**			*COVID-19 Infection*	**P Value**
	No Changes	Increase	Decrease		
Low	109 (66,5%)	32 (19,5%)	23 (14,0%)	**164 (100%)**	**0,981**
Moderate- Severe	22 (64,7%)	7 (20,6%)	5 (14,7%)	**34 (100%)**	
Total	**131 (66,2%)**	**39 (19,7%)**	**28 (14,1%)**	**198 (100%)**	

G. Relationship between menstrual frequency disturbances and COVID-19 infection

Table 10 shows the results of the relationship between menstrual frequency disturbances and COVID-19 infection using chi-square. The results of the analysis on 198 respondents showed that of the respondents who had COVID-19 infection with mild symptoms, 140 (85.5%) of them did not experience these disturbances, while 24 (14.6%) of the respondents experienced menstrual frequency disturbances. Meanwhile, for respondents infected with COVID-19 with moderate to severe symptoms, 26 (76.5%) respondents did not experience the disorder and 8 (23.5%) experienced the disorder. Chi-square test results show a p value with a value of 0.305 or a p value > 0.05. The odds ratio is 1.795, so a risk percentage is obtained of 44% or if someone is infected with COVID-19 he has a 44% risk of experiencing bleeding disorders between menstrual periods. Then for the 95% Confidence Interval a range of 0.728 – 4.428 is obtained or if this research is carried out a hundred times it will produce an odds ratio value between that range. So it can be concluded that there is no significant relationship between menstrual frequency disturbances and COVID-19 infection.

Table 10 Relationship Between Menstrual Frequency Disorders and COVID-19 Infection

COVID-19 Infection	**Frequency Disturbance**		**Total**	***P Value***	***Odds Ratio***	***95% Confidence Interval***	***Risk***
	No	Yes					
Low	140 (85,5%)	24 (14,6%)	**164 (100%)**	**0,305**	**1,795**	**0,728 -4,428**	**44%**
Moderate-Severe	26 (76,5%)	8 (23,5%)	**34 (100%)**				
Total	**166 (83,8%)**	**32 (16,2%)**	**198 (100%)**				

H. Relationship between menstrual regularity disorders and COVID-19 infection

Table 11 shows the results of the relationship between menstrual regularity disorders and COVID-19 infection using chi-square. The results of the analysis on 198 respondents showed that of the respondents who experienced COVID-19 infection with mild symptoms, 129 (78.7%) of them did not experience the disorder, while 35 (21.3%) of the respondents experienced menstrual regularity disturbances. Meanwhile, for respondents infected with COVID-19 with moderate to severe symptoms, 25 (73.5%) respondents did not experience the disorder and 9 (26.5%) experienced the disorder. The results of the chi-square test showed a p value of 0.669 or a p value > 0.05. The odds ratio is 1.327, so that a risk percentage of 57% is obtained or if a person is infected with COVID-19 he has a 57% risk of experiencing menstrual cessation disorders. Then for the 95% Confidence Interval a range of 0.568 - 3.1 is obtained or if this research is carried out a hundred times it will produce an odds ratio value between that range. So it can be concluded that there is no significant relationship between menstrual regularity disorders and COVID-19 infection.

Table 11 Relationship Between Menstrual Regularity Disorders and COVID-19 Infection

COVID-19 Infection	**Regularity Disorders**		**Total**	***P Value***	***Odds Ratio***	***95% Confidence Interval***	***Risk***
	No	Yes					
Low	129 (78,7%)	35 (21,3%)	**164 (100%)**	**0,669**	**1,327**	**0,568 - 3,1**	**57%**
Moderate-Severe	25 (73,5%)	9 (26,5%)	**34 (100%)**				

Total	**154 (77,8%)**	**44 (22,2%)**	**198 (100%)**				

I. Relationship between menstrual pain disorders and COVID-19 infection

Table 12 shows the results of the relationship between menstrual pain disorders and COVID-19 infection using chi-square. The results of the analysis on 198 respondents showed that of the respondents who experienced COVID-19 infection with mild symptoms, 101 (61.6%) of them did not experience these disturbances, while 63 (38.4%) of the respondents experienced pain during menstruation. Meanwhile, for respondents infected with COVID-19 with moderate to severe symptoms, 19 (55.9%) respondents did not experience the disorder and 15 (44.1%) experienced the disorder. The results of the chi-square test showed a p value of 0.670 or a p value > 0.05. The odds ratio is 1.266, so a risk percentage of 57% is obtained or if a person is infected with COVID-19 he has a 57% risk of experiencing menstrual pain disorders. Then for the 95% Confidence Interval a range of 0.6 – 2.67 is obtained or if this research is carried out a hundred times it will produce an odds ratio value between that range. So it can be concluded that there is no significant relationship between menstrual pain disorders and COVID-19 infection.

Table 12 Relationship Between Menstrual Pain Disorders and COVID-19 Infection

COVID-19 Infection	**Pain Disorders**		**Total**	***P Value***	***Odds Ratio***	***95% Confidence Interval***	***Risk***
	No	Yes					
Low	101 (61,6%)	63 (38,4%)	**164 (100%)**	**0,670**	**1,266**	**0,6 - 2,67**	**55%**
Moderate- Severe	19 (55,9%)	15 (44,1%)	**34 (100%)**				
Total	**120 (60,6%)**	**78 (39,4%)**	**198 (100%)**				

4. Discussion

In this study, menstrual disorders did not have a significant relationship with COVID-19 infection (P>0.05). The Odd Ratio has a value of 1.338 so that a risk value of 57% can be calculated, or it can be interpreted that if someone is infected with COVID-19 there is a 57% risk of experiencing menstrual disorders. Then, based on the 95% confidence interval, it shows that if this research is carried out 100 times, it will produce an odds ratio range of 0.611 – 2.931 so that the risk range for someone experiencing menstrual disorders after being infected with COVID-19 is 37 - 74%.

The selection of respondents was based on the coverage of the sample population where the Faculty of Medicine and Nursing are in the same area, making it easier for researchers to collect respondent data. For the selection of batches based on female students who are still undergoing preclinical education, namely the 2020-2022 class. Where in this generation the age range of female students who were respondents in this study were 17-27 years old.

This study has similar results to the journal "SARS-CoV-2 infection and subsequent changes in the menstrual cycle among participants of the Arizona CoVHORT study" published by Sana M. Khan, MPH on September 21, 2021. In this journal, out of 127 only 16 % of respondents who experienced menstrual disorders after being infected with COVID-19. Of the 16% of respondents who experienced menstrual disorders, the types of disturbances experienced were regularity disturbances, frequency disturbances, and menstrual pain disorders. The journal states that 60% of respondents who experience menstrual disorders are those who have a Body Mass Index > 25 or are overweight, and experience stress. So that the results of the journal have similarities with the results of the researchers, namely there is no significant relationship between disruption of menstrual regularity, frequency, and pain with COVID-19 infection.7

In addition, there is no significant relationship between menstrual duration and volume and COVID-19 infection. Based on the journal "The Impact of Stress on the Menstrual Cycle During the 2019 Coronavirus Disease Pandemic: A Survey Study" published by Noelle Ozimek on January 12 2022, which compared women who experienced menstrual disorders and experienced stress when infected with COVID-19 or after being infected with COVID-19 with women who also experience menstrual disorders but do not experience stress when infected with Covid or after being infected with COVID-19. This study shows that the percentage of women who also experience stress when infected or after being infected with COVID-19, 82% experience menstrual disorders. In this study, out of 210 respondents, the types of disturbances experienced were disturbances of menstrual duration, pain, and volume. The journal proves that COVID-19 infection is not a cause of menstrual disorders, especially in disorders of menstrual duration and volume because the cause is stress with a p-value of 0.028.8

Based on these two studies, the main causes of menstrual disorders, both disturbances in duration, frequency, regularity, volume and pain, are stress and weight loss. While in this study, the Body Mass Index and the stress level of the patients were included as confounding factors so that they were not taken into account when collecting data on the respondents. This is because researchers have considered that if these two variables are included in the exclusion factors of this study, then the minimum value of the number of respondents will not necessarily be achieved within the allotted time.

The results obtained by the researchers and the two previous journals differ from the journal "Menstrual Changes Following COVID-19 Infection: A Cross-Sectional Study From Jordan and Iraq (2022)" which concluded that of the 483 respondents who experienced menstrual disorders, namely duration disturbances that occurred in 41.8% of respondents, regularity disturbances in 22.6% of respondents, frequency disturbances in 18.8% of respondents, volume disturbances in 47.2% of respondents, and menstrual pain experienced by 42% of respondents have a significant relationship with COVID infection - 19. The results obtained in this journal may differ from the results of the researchers because in this journal, an assessment of Body

Mass Index and stress levels was carried out simultaneously from the respondents, the study also had different results from the two journals which had similar results to the researchers because the journal This coverage of respondents is wider and the number of samples is quite large. So as to minimize the occurrence of bias when data collection is carried out on respondents.2

This research was conducted with the aim of knowing whether there is a relationship between menstrual disorders and COVID-19 infection in female students of the Faculty of Medicine and Nursing, Pelita Harapan University. In this study, measuring instruments for menstrual disorders used the S1 Appendix questionnaire to assess the types of menstrual disorders they experienced. The questionnaire uses a Guttman scale with each statement given two to three choices consisting of agreeing and disagreeing with the given statement.

This research has advantages because it was carried out during a pandemic and took a topic where this issue is still a topic that is widely debated throughout the country and a lot of supporting research is needed to determine the truth of this issue.

The limitations in this study are the limited reference sources because the topics discussed by researchers are issues that have recently emerged and are still ongoing today, so the number of studies that have been carried out is still limited. In addition, other causes, namely confounding factors such as Body Mass Index and stress levels were not investigated further in this study. Data collection regarding the severity of the symptoms of respondents who were infected with COVID-19 in this study was also subjective, because it was not based on a clear objective scale and was only based on what the respondents felt personally, which allowed for bias to arise. Then for female student data in detail that displays the types of menstrual disorders experienced by each respondent because one female student can experience more than one menstrual disorder simultaneously after being infected with COVID-19, cannot be described one by one because the number is too large.

Further research is needed on this topic, with a larger number of respondents and on a larger scale and involving female students from various faculties and universities in Indonesia as well as taking into account risk factors that have not been included by researchers in this study, namely Body Mass Index and Stress level.

5. Conclusion

Based on the research results, it can be concluded that: 1). Based on the results of the study, it can be concluded that there is no relationship between menstrual disorders and COVID-19 infection in UPH Faculty of Medicine and Nursing students, because the p value is > 0.05. 2). The most common type of menstrual disorder experienced by female students of the Faculty of Medicine and Nursing at Pelita Harapan University after being infected with COVID-19 was menstrual disturbances.

6. Suggestion

This research can be used as an evaluation of the relationship between menstrual disorders and COVID-19 infection in female students of the Faculty of Medicine and Nursing, Pelita Harapan University. Suggestions for further research with similar topics are: 1). Retrieving data regarding Body Mass Index and stress levels from respondents. 2). Using a COVID-19 severity classification scale to determine the severity of symptoms experienced by respondents so that the data obtained is not subjective and reduces the possibility of bias. 3). It is necessary to add more respondents from various regions in Indonesia so that the coverage of respondents becomes wider and can represent more female students from each region in Indonesia.

Ethical Approval

This Journal has been approved by Ethics Committees of the Faculty of Medicine, Pelita Harapan University and also has a statement of approval from the participating respondents.

Funding

This research did not receive any specific grant from any funding institution in the public, commercial, nor profit sector.

Availability of data and materials

The availability of data and materials are confidential and can only be accessed by the authors.

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