ISSN 2598 0580

Bioscientia Medicina Volume 3, Issue 1, Page No: 1-13
Available online : www.bioscmed.com
Bio Sc Med 3(1) :1-13

Stress Induces Menstrual Cycle Disturbance Among Female Students in Faculty of Medicine Universitas Sriwijaya

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Received : November 19th 2018

Accepted :January 29th 2019

Abstract

Background :

Menstruation occurs regularly every month will form a menstrual cycle. Normal menstrual cycles in women range from 21-35 days. However, the menstrual cycle is not always normal, many women experience menstrual disturbance. Menstrual cycle disturbance are caused by several factors, which is stress.

Objective :

This study aims to analyze the association of stress level with menstrual cycle disturbance among female students in Medical Faculty of Sriwijaya University.

Methods :

This study is analytical cross-sectional study with primary data from menstrual cycle, stress ISMA, personality type DSM V questionnaires..

Results :

In this study, 503 samples are fulfilled inclusion criteria. Among 503 subjects, 59 (11.7%) female students experienced polymenorrhea, 391 (77.7%) female students had normal menstrual cycles, 53 (10.6%) female students experienced olygomenorrhea. Chi Square test showed that there was an association between stress level and menstrual cycle disturbance.

Conclusion :

There is a significant association between between stress level and menstrual cycle disturbance among female students in Medical Faculty of Sriwijaya University.

Keywords: Stress level, Menstrual cycle disturbance, Female Student

1. Introduction

Menstruation is one aspect of sexual maturity that first occurs during puberty in a woman. Menstruation that occurs regularly every month will form a menstrual cycle. The occurrence of a regular menstrual cycle is a sign that a woman's reproductive organs are functioning properly. Normal menstrual cycles in women range from 21-35 days. Disorders in the menstrual cycle consisted of three, namely: a short menstrual cycle also called polimenore, a long menstrual cycle or oligomenorrhea, and amenorrhea if menstruation does not arrive in 3 consecutive months.[1]

Disorders of the menstrual cycle are caused by several factors, one of which is stress.[2] Women have twice the tendency to experience stress compared to men.[3] Stress is a nonspecific response to the load which is a behavioral physiological response from humans who try to adapt and regulate both internal and external pressure. One of the factors that determines stress levels is the mechanism of coping mechanisms that are largely determined by individual personality.[4] In their influence on the menstrual cycle, stress involves a hormonal system as a system that plays a major role in women's reproduction.[5]

Based on research on stress levels carried out in Saudi Arabia against 494 students, it is known that the prevalence of stress in medical faculty students is 57%, 21.5% of them are mild stress, 15.8% are moderate stress, and 19.6% are severe stress. From this study it was found that the proportion of stressed female students was greater (75.7%) than men (57%). This shows that female students experience stress more easily in academics than men.[6]

Some studies state that there is a relationship between stress and the menstrual cycle. Research in Japan reported 63% of 221 Japanese students experienced menstrual cycle disorders with the main factor being higher stress levels than those who did not experience menstrual cycle disorders.[7] Other studies showed a significant relationship between academic stress and menstrual cycle disorders in 393 Uyo University students . The results showed that 37.5% experienced polimenore, oligomenorrhea 19.9%, and amenorrhea 5.9% .[8] Research in 2003 reported a significant relationship between stress and menstrual cycles, almost 1/3 of the samples experienced impaired menstrual cycles.[9]

These studies show that quite a lot of women experience stress, which disrupts the menstrual cycle. Impaired menstrual cycles can result in a decrease in quality of life. This study

was conducted to determine the relationship between stress level and menstrual cycle in female students of the Medical Education Study Program, Faculty of Medicine, Universitas Sriwijaya.

2. Research Methods

The type of research used is observational analytic research with cross-sectional design. The sample in this study were all female students of the Medical Education Study Program, Faculty of Medicine, Universitas Sriwijaya who met the inclusion criteria. With a total sampling technique of 503 female students.

The inclusion criteria for this study were the 2015-2018 students of the Medical Education Study Program of the Faculty of Medicine, Universitas Sriwijaya and students who had signed a letter of approval for filling out the questionnaire. The exclusion criteria of this study were female students who had a history of non-menstruation for three consecutive months, female students who had a history of thyroid disease, female students who were on a diet low in fat and calories.

In this study the data will be analyzed by bivariate analysis and univariate analysis. The purpose of this univariate analysis is to explain or describe the characteristics of each variable under study. Bivariate analysis was used to test the relationship between stress levels and menstrual cycles by using the Chi-Square test so that p values and OR values were obtained using significance degrees $\alpha = 0.05$ (95% confidence level).

3. Results

The following table 1 presents the distribution of research subjects based on age, BMI, Menstrual Cycle, Stress Level, and personality. Of the 503 research subjects, the most subjects were 19 years old as many as 131 people (26%), the youngest subjects aged 16 years as many as 1 person (0.2%), and the oldest subject aged 29 years as many as 1 person (0.2%).

Of the 503 research subjects, 91 (18.1%) underweight female students, 352 (70%) female students had normal BMI, 45 (8.9%) overweight students, and 15 (3%) obese female students.

Of the 503 research subjects, 59 (11.7%) female students experienced polimenorea, 53 (10.6%) female students experienced oligomenorrhea and 391 (77.7%) female students had normal menstrual cycles.

Of the 503 research subjects, there were 8 (1.6%) students who experienced mild stress, 341 students who experienced moderate stress (67.8%), and 154 students (30.6%) who experienced severe stress.

From 503 research subjects, 68 (13.5%) borderline students, 105 (20.9%) obsessive compulsive students, 95 (18.9%) avoidant students, 21 schizotypal students (4.2 %) people, students with antisocial personality as many as 114 (22.7%), female students with narcissistic personality as many as 100 (19.9%) people.

Table 1. Distribution of students of the Medical Faculty of Sriwijaya University based on age, BMI, Menstrual Cycle, Stress Level, and personality. (N = 503)

Age	N	%
16	1	0.2
17	40	8.0
18	109	21.7
19	131	26.0
20	123	24.5
21	85	16.9
22	10	2.0
25	2	0.4
28	1	0.2
29	1	0.2
BMI	**N**	**%**
Underweight	91	18.1
Normal	352	70.0
Overweight	45	8.9
Obesity	15	3.0
Mentrual Cycle	**N**	**%**
Polymenorea	59	11.7
Normal	391	77.7
Oligomenorea	53	10.6
Stress Level	**N**	**%**
Mild Stres	8	1.6
Moderate Stres	341	67.8
Severe Stres	154	30.6
Personality	**N**	**%**
Borderline	68	13.5
Obsessive Compulsive	105	20.9
Avoidant	95	18.9
Schizoitipal	21	4.2
Antisocial	114	22.7
Narcistic	100	19.9

In table 2, it is seen that female students with a severe stress level of 154 female students, 47 (30.5%) of them experience abnormal menstrual cycles and as many as 107

(69.5%) students experience a normal menstrual cycle. Of the 8 female students who have mild stress levels, as many as 3 (37.5%) students experience abnormal menstruation, as many as 5 (62.5%) students experience normal menstrual cycles. The p value obtained is based on the Chi-square test results of 0.677 ($p < 0.05$). These results indicate that there is no statistically significant relationship between the category of mild severe stress with menstrual cycle disorders and the prevalence odds ratio obtained shows that there is no significant relationship between the category of mild severe stress and menstrual cycle disorders at the 95% confidence interval.

Female students with a severe stress level of 154 female students, 47 (30.5%) of them experienced abnormal menstrual cycles and as many as 107 (69.5%) students experienced a normal menstrual cycle. While students with moderate stress levels, as many as 62 (18.2%) experience abnormal periods and as many as 279 (81.8%) students experience normal menstrual cycles. The p value obtained based on the Chi-square test results is 0.002 ($p < 0.05$). These results indicate that there is a statistically significant relationship between moderate stress categories with impaired menstrual cycles. The prevalence odd ratio obtained in 1.977 showed that students with severe stress levels were at a risk of 0.732 times experiencing menstrual cycle disorders compared to students with moderate stress levels, this was significant at the 95% confidence interval.

Female students with a stress level of 131 students, 24 (18.3%) of them experienced a polymorrhoea menstrual cycle and as many as 107 (81.7%) students experienced a normal menstrual cycle. Of the 6 female students who had mild stress levels, as many as 1 (16.7%) students experienced menstrual polymorrhea, as many as 5 (83.3%) students experienced normal menstrual cycles. The p value obtained is based on the Chi-square test result of 0.918 ($p < 0.05$). These results indicate that there is no statistically significant relationship between the category of mild severe stress with menstrual cycle disorders and the prevalence odds ratio obtained shows that there is no significant relationship between the category of mild severe stress and menstrual cycle disorders at the 95% confidence interval.

Female students with a severe stress level of 131 female students, 24 (18.3%) of whom experienced the menstrual cycle of polimenorea and 107 (81.7%) students experienced a normal menstrual cycle. Students who have moderate stress levels are as many as 313 female students, 34 (10.9%) female students experience menstrual periods, 279 (89.1%) students

experience normal menstrual cycles. The p value obtained is based on the Chi-square test result of 0.033 (p <0.05). These results indicate that there is a significant relationship between moderate stress categories with a menstrual cycle disorder statistically. The prevalence odd ratio obtained was 1,841 which showed that female students with severe stress levels had a risk of 1,841 times having menstrual cycle disorders compared to students with mild stress levels and significant at 95% confidence interval.

Female students with a severe stress level of 130 female students, 23 (17.7%) of whom experienced the oligomenorrhea menstrual cycle and as many as 107 (82.3%) students experienced a normal menstrual cycle. Of the 7 female students who had mild stress levels, as many as 2 (28.6%) students experienced oligomenorrhea menstruation, as many as 5 (71.4%) students experienced normal menstrual cycles. The p value obtained is based on the Chi-square test results of 0.468 (p <0.05). These results indicate that there is no statistically significant relationship between the categories of mild severe stress with menstrual cycle disorders and the prevalence odds ratio obtained shows that there is no significant relationship between the category of mild severe stress and the disorder.

Table 3 shows the relationship between personality types and stress levels. Female students with 68 borderline type personality. The p value obtained is based on the Chi-square test result of 0.000 (p <0.05). These results indicate that statistically there is a significant relationship between the categories of personality types with moderate stress. The prevalence odd ratio obtained was 2,946 which showed that female students with borderline personality types had a risk of 2,946 times experiencing moderate stress compared to female students with a non-borderline personality type and significant at a 95% confidence interval.

Female students with an obsessive compulsive personality type of 25 female students. The p value obtained is based on the Chi-square test result of 0.442 (p <0.05). These results indicate that there is no statistically significant relationship between the personality type category with mild stress and the prevalence odds ratio obtained shows that there is no significant relationship between the personality type category with mild stress at the 95% confidence interval.

Female students with obsessive compulsive personality type as many as 103 students, p value obtained based on Chi-square test results of 0.031 (p <0.05). These results indicate that there is a statistically significant relationship between the categories of personality types with

moderate to severe stress statistically. The prevalence odd ratio obtained by 0.573 showed that students with the obesessive compulsive personality type as a protective factor of 42.7% experienced moderate stress compared to female students with a compulsive and significant non-obsessive personality type at the 95% confidence interval.

Table 2. Relationship between stress categories and menstrual cycle disorders in Sriwjaya University Medical School students (N = 503).

Stress Level	Menstrual Cycle				
	Abnormal	Normal	Total	P Value	POR CI 95%
Severe	47(30.5%)	107(69.5%)	154(100%)	0.677	0.732(0.168-3.190)
Mild	3(37.5%)	5(62.5%)	8(100%)		
Total	50(30.9%)	112(69.1%)	162(100%)		
Stress Level	**Menstrual Cycle**				
	Abnormal	**Normal**	**Total**	**P Value**	**POR CI 95%**
Severe	47 (30.5%)	107 (69.5%)	154 (100%)	0.002	1.977 (1.273-3.068)
Mild	62 (18.2%)	279 (81.8%)	341 (100%)		
Total	109 (22%)	386 (78%)	495 (100%)		
Stress Level	**Menstrual Cycle**				
	Polymenorrhea	**Normal**	**Total**	**P Value**	**POR CI 95%**
Severe	24 (18.3%)	107 (81.7%)	131 (100%)	0.918	1.121 (0.125-10.043)
Mild	1 (16.7%)	5 (83.3%)	6 (100%)		
Total	25 (18.2%)	112 (81.8%)	137 (100%)		
Stress Level	**Menstrual Cycle**				
	Polymenorrhea	**Normal**	**Total**	**P Value**	**POR CI 95%**
Severe	24 (18.3%)	107 (81.7%)	131 (100%)	0.033	1.841 (1.043-3.248)
Mild	34 (10.9%)	279 (89.1%)	313 (100%)		
Total	58 (13.1%)	386 (86.9%)	444 (100%)		
Stress Level	**Menstrual Cycle**				
	Oligomenorrhea	**Normal**	**Total**	**P Value**	**POR CI 95%**
Severe	23 (17.7%)	107 (82.3%)	130 (100%)	0.468	0.537 (0.098-2.943)
Mild	2 (28.6%)	5 (71.4%)	7 (100%)		
Total	25 (18.2%)	112 (81.8%)	137 (100%)		
Stress Level	**Menstrual Cycle**				
	Oligomenorrhea	**Normal**	**Total**	**P Value**	**POR CI 95%**
Severe	23 (17.7%)	107 (82.3%)	131 (100%)	0.011	2.142 (1.182-3.883)
Mild	28 (9.1%)	279(90.9%)	307 (100%)		
Total	51 (11.7%)	386 (88.3%)	437 (100%)		

Female students with avoidant personality types as many as 95 female students, p value obtained based on Chi-square test results of 0.000 ($p < 0.05$). These results indicate that there is a statistically significant relationship between the categories of personality types with moderate to severe stress statistically. The prevalence odd ratio obtained was 3,533 which showed that students with avoidant personality types had a risk of 3,533 times experiencing moderate stress compared to female students with a non-avoidant personality type and significant at the 95% confidence interval.

Female students with a schizotipal personality type of 4 female students. The p value obtained based on the Chi-square test results is 0.222 (p <0.05). These results indicate that there is no significant relationship between the categories of personality types with light weight stress statistically and the prevalence odds ratio obtained shows that there is no significant relationship between the categories of personality types with mild stress at the 95% confidence interval.

Female students with 26 antisocial personality types. The p value obtained is based on the Chi-square test result of 0.000 (p <0.05). These results indicate that there is a significant relationship between the categories of personality types with mild mild stress statistically. The prevalence odd ratio obtained was 0.050 which showed that female students with antisocial personality type as a protective factor of 95% experienced mild stress compared to female students with non-antisocial personality types and were significant at 95% confidence intervals.

Female students with 26 antisocial personality types. The p value obtained is based on the Chi-square test result of 0.001 (p <0.05). These results indicate that there is a statistically significant relationship between the categories of personality types with moderate to severe stress statistically. The prevalence odd ratio obtained was 0.429 which indicates that female students with antisocial personality type as a protective factor of 57.1% experienced mild stress compared to female students with non-antisocial personality types and were significant at 95% confidence intervals.

Female students with narcissistic personality types as many as 100 female students. The p value obtained based on Chi-square test results is 0.003 (p <0.05). These results indicate that there is a statistically significant relationship between the categories of personality types with moderate to severe stress statistically. The prevalence odd ratio obtained is 0.452 which indicates that female students with narcistic personality type as a protective factor of 54.8% experience moderate stress compared to female students with non-narcistic personality types and are significant at 95% confidence intervals.

Table 3. Relationship between categories of personality types and stress levels in Sriwjaya University Medical School students (n = 495)

Personality	Stress Level		Total	P Value	POR CI 95%
	Severe	Moderate			
Borderline	36 (52.9%)	32 (47.1%)	68 (100%)	0.000	2.946 (1.749-4.962)
Non Borderline	118 (27.6%)	309 (72.4%)	427 (100%)		
Total	154 (31.1%)	341 (68.9%)	495 (100%)		
Personality	**Stress Level**				
	Severe	**Mild**	**Total**	**P Value**	**POR CI 95%**
Obsessive Compulsive	23 (92%)	2 (8%)	25 (100%)	0.442	0.527 (0.100-2.772)
Non Obsessive Compulsive	131 (95.6%)	6 (4.4%)	137 (100%)		
Total	154 (95.1%)	8 (4.9%)	162 (100%)		
Personality	**Stress Level**				
	Severe	**Moderate**	**Total**	**P Value**	**POR CI 95%**
Obsessive Compulsive	23 (22.3%)	80 (77.7%)	103 (100%)	0.031	0.573 (0.344-0.953)
Non Obsessive Compulsive	131 (33.4%)	261 (66.6%)	392 (100%)		
Total	154 (31.1%)	341 (68.9%)	495 (100%)		
Personality	**Stress Level**				
	Severe	**Moderate**	**Total**	**P Value**	**POR CI 95%**
Avoidant	52 (54.7%)	43 (45.3%)	95 (100%)	0.000	3.533 (2.225-5.610)
Non Avoidant	102 (25.5%)	298 (74.5%)	400 (100%)		
Total	154 (31.1%)	341 (68.9%)	495 (100%)		
Personality	**Stress Level**				
	Severe	**Moderate**	**Total**	**P Value**	**POR CI 95%**
Schizotipal	4 (19%)	17 (81%)	21 (100%)	0.222	0.508 (0.168-1.536)
Non Schizotipal	150 (31.6%)	324 (68.4%)	474 (100%)		
Total	154 (31.1%)	341 (68.9%)	495 (100%)		
Personality	**Stress Level**				
	Severe	**Mild**	**Total**	**P Value**	**POR CI 95%**
Antisosial	20 (76.9%)	6 (23.1%)	26 (100%)	0.000	0.050 (0.009-0.264)
Non Antisosial	134 (98.5%)	2 (1.5%)	136 (100%)		
Total	154 (95.1%)	8 (4.9%)	162 (100%)		
Personality	**Stress Level**				
	Severe	**Moderate**	**Total**	**P Value**	**POR CI 95%**
Antisosial	20 (18.5%)	88 (81.5%)	26 (100%)	0.001	0.429 (0.253-0.728)
Non Antisosial	134 (34.6%)	253 (65.4%)	387 (100%)		
Total	154 (31.1%)	341 (68.9%)	495 (100%)		
Personality	**Stress Level**				
	Severe	**Moderate**	**Total**	**P Value**	**POR CI 95%**
Narcistic	19 (19%)	81 (81%)	100 (100%)	0.003	0.452 (0.263-0.776)
Non Narcistic	135 (34.2%)	260 (65.8%)	395 (100%)		
Total	154 (31.1%)	341 (68.9%)	495 (100%)		

4. Discussions

In this study, the majority of respondents had a moderate stress level of 67.8%, this is in line with the 2018 study on students in Timisoara Romania said that 75% of respondents had moderate stress levels.[10] Other studies using different instruments were conducted by Sohail in

2013 on medical students in Pakistan said that 71.67% of respondents had moderate stress levels, 20.83% had severe stress levels and 7.5% had mild stress levels.[11] The results of this study were also in line with research in Iran in 300 medical students, the majority of subjects (61.3%) have moderate stress levels.[12] This is possible because of internal and external demands from academic life that can put pressure beyond the ability of students.

The majority of respondents in this study had a normal menstrual cycle of 77.7%. This is also in line with the results of research in Turkey, out of the 480 respondents the majority had normal menstrual cycles.[13]

Based on table 2, it is known that there is a significant relationship between the level of severe stress and moderate stress with menstrual cycle disorders (moderate stress-moderate stress with normal menstrual cycle - abnormal menstrual cycle, moderate stress, moderate stress with menstrual cycle polimenorea, normal menstrual cycle, moderate stress, moderate menstrual cycle oligomenorrhea - normal menstrual cycle). This is in line with the results of a study conducted by Ekpenyong in 2011 on 393 Uyo University female students in Nigeria.[8] Female students experiencing stress have about 2 times the chance of experiencing menstrual disorders (OR: 2.0, C.I = 1,224-2,837) at P <0.05. This study shows a significant relationship between stress and menstrual disorders at Uyo University, Southeast Nigeria. At midwives aged 18-21 years, midwifery students showed that stress levels had a significant relationship with the menstrual cycle with a value of p = 0.001.[14]

Based on table 2, it can be seen that the relationship between mild stress and menstrual cycle disorders is not significant. This condition strengthens the theory (the general assumption) that the possibility of women who are not experiencing stress or stress is relatively mild to experience impaired menstrual cycles is relatively small.

The results of several studies also explain that when stress occurs the hypothalamic-pituitary-adrenal axis causes several changes, including the reproductive system, which is an abnormal menstrual cycle.[15] When stress occurs, a body response will occur where the amygdala in the limbic system will be activated so that it will stimulates the hypothalamus to produce the hormone Gonadotropin Releasing Hormone (GnRH), where the GnRH hormone will secrete the hormones FSH and LH which play a major role in the menstrual cycle.[5] FSH hormone plays a role in the maturation process of follicles in the ovary LH hormone increases directly with increased levels of estrogen and progesterone body. Increased estrogen levels will

cause thickening of the endometrium which prepares for ovulation. If ovulation does not occur, LH levels will shrink so that estrogen and progesterone levels also shrink rapidly. As estrogen and progesterone shrink rapidly, the spiral artery becomes spasm, so that the blood supply to the fungition endometrium stops and necrosis occurs. The functional layer is separated from the basal layer and menstrual bleeding begins.[16]

From the explanation above, it was found that the higher a woman's stress level would cause a surge in LH and FSH hormones in her body, which resulted in the menstrual cycle process being disrupted than normal so that the menstrual cycle could shorten and lengthen.

The relationship between categories of personality types and stress levels in Sriwjaya University Medical School students is shown in tables 16 to table 23. Based on these tables it can be seen that broadly there is a significant relationship between personality types and stress levels. The results of this study are in line with research by Panchu et al in 2016 entitled The Interrelationship of Personality with Stress in Medical Student. The results of his research show that there is a significant relationship between personality type and stress level with a p-value = 0.01.[17]

There are several personality types that are statistically very closely related to stress levels, namely borderline personality type, obsessive compulsive, avoidant, anti-social, and narcissistic. This condition is very understandable because borderline personality types, obsessive compulsive, avoidant, anti social, and narcissistic are indeed very vulnerable and easy to experience stress.

According to PPDGJ III and DSM IV, borderline personality has emotional instability and instability in interpersonal relationships that can lead to stress. Then, obsessive compulsive personality is characterized by excessive accuracy, meticulousness, showing perfectionism that interferes with the completion of tasks that result in the stressful occurrence of stress. Avoidant personality or commonly called avoidance personality type can be characterized by someone who avoids activities that involve significant interpersonal contracts because of fear of criticism and rejection so that people with this personality type tend to hold back which can lead to stress. Furthermore, in the anti-social personality, withdrawing from the social is making it difficult to control the stressor which results in stress susceptibility. And narcissistic personalities are often characterized by individuals who have a sense of pride in themselves,

want to be praised constantly. Individuals with this narcissistic personality are very unhappy with criticism so they are prone to stress.

5. Conclusion

The conclusion obtained from this study is that there is a significant relationship between stress levels and menstrual cycle disorders in female students of the Medical Education Study Program, Faculty of Medicine, Universitas Sriwijaya.

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