Original Article

Effect of Educational Stress on Menstrual Cycle in Female Medical Students Studied in College of Medicine/Diyala Universities Comparing with Non-Medical Students in Other Colleges

Raakad Kamel Saadi[1]*, Sawsan Talib Salman[1], Saja Fayeq Hassuby[2], Hoor Dhamer Adnaan[3]

[1]Department of Gynaecology and Obstetrics, College of Medicine, Diyala University, Iraq.
[2]Al-Batool Maternal Teaching Hospital, Diyala Health Directorate, Iraq.
[3]College of Medicine, Diyala University, Iraq.
Email: raghed@uodiyala.edu.iq

Abstract

Recently educational stress became a problematic issue for college students due to increaseing deadlines and competition between students. This stress has an impact on the physical and mental health of the students, as high levels of stress affect the neuroendocrine axis which may lead to changes in the menstrual cycle. The study aimed to assess the association of educational stress levels with the incidence of menstrual cycle changes among medical students compared to non-medical students. The study, which was conducted at the University of Diyala, Iraq, included 600 participants, 400 medical students, and 200 non-medical students. The researchers collected data on length, flow, pattern, and stress-related dysmenorrhea through a questionnaire and analyzed it using statistical analysis. The results showed that there is a significant association between stress and dysmenorrhea. Other less prevalent associations were heavy menstrual bleeding. Most of these changes occurred in clinical years of academic study. It was concluded that menstrual cycle changes are more frequent among medical students due to the high levels of stress.

Keywords: Educational stress, menstrual changes, dysmenorrhea, bleeding.

Introduction

With the expansion of college students every year, competition and challenges becomes the root to study more in order to obtain remarkable grades and this in turn puts pressure or stress on students' shoulders. Although such kinds of stressors are considered good because it rises the levels of competition, experiencing excessive or chronic stress can lead to psychological disturbances.[1] The definition of stress is the exaggeration of physiological reactions including mental and physical reactions to reach self-preservation.[2] External demands and expectations in the academic life of medical students are the most important factors of stress.[3] It is worth mentioning that a reasonable level of stress is required among students for good and healthy competition but when it turns into anxiety and chronic stress, a series of deleterious effects (psychological and physical) start to appear.[4] Recently, stress among students in the field of medicine starts to increase year by year.[5] When it comes to comparing stress responses in men and women, it shows that men respond higher to stressful situations as a result of higher cortisol hormone, blood pressure, and epinephrine than women.[6,7] Moreover, research studies show that bad stress has a negative impact on the hypothalamus-pituitary ovarian axis, which releases undesirable levels of corticotropin released hormone, and that in turn creates disturbances in the duration and length of the menstrual cycle. The normal length of the menstrual cycle is 21 to 35 days and the duration would take 3-7 days in healthy adults.[8-10]

Access this article online

Quick Response Code:

Website: www.jnsbm.org

DOI: https://doi.org/10.4103/jnsbm.JNSBM_14_1_11

Address for Correspondence: Department of Gynaecology and Obstetrics, College of Medicine, Diyala University, Iraq
Email: raghed@uodiyala.edu.iq

Submitted: 20th April, 2023 **Received:** 23rd April, 2023
Accepted: 17th June, 2023 **Published:** 07th July, 2023

How to cite this article: Saadi R K, Salman S T, Hassuby S F, Adnaan H D. Effect of Educational Stress on Menstrual Cycle in Female Medical Students Studied in College of Medicine/Diyala Universities Comparing with Non-Medical Students in Other Colleges. J Nat Sc Biol Med 2023;14:63-67

In addition to that studies also present the link between bad stress and dysmenorrhea in college students which in the end affects the society by losing productivity. Hence dysmenorrhea can be defined as painful menstruation that can be classified into two categories, primary dysmenorrhea excludes pelvic pathologies and secondary dysmenorrhea includes pelvic pathology or other chronic diseases.[11]

Patients and Methods

A total of 600 female college students of age (17-25) years participated in this cross-sectional study during the period from fifteenth of August 2022 to the fifteenth of January 2023 after obtaining informed consent from them. 400 females were medical students at Diyala University. While the rest 200 were non-medical students belonging to law, engineering, and biology colleges, all of them studying at Al-Yarmook University from stage one to the final stage. Exclusion criteria were only females with a history of neurological or psychological disorders, medical or surgical history, any medications affecting the emotional or endocrinological state, or any drug or hormone. The students were asked to fill questionnaire related to stress and menstrual changes. Which include (duration of menstruation days, regularity, perception of blood amount, any menstrual changes that occur during stressful conditions and type of the change.

Statistical Analysis

The data were analyzed using the Statistical Package for Social Sciences (SPSS) for Windows version 16. The analysis was done through Chi-square to test the independence between traits to discover significant relationships between the factors. In this analysis p-value less than 0.05 was considered statistically significant.

Results

From data collection conducted on students of the faculty of the Medicine University of Diyala as many as 400 respondents and non-medical students of Al YarmookUniversity as many as 200 respondents.

Table 1 shows that majority of individuals in the age group <20 years and more than 25 years had no menstrual changes related to stress, with percentages of 63.5% and 89.5% respectively, However a majority of individuals in age group 21-25 experienced menstrual changes related to stress. These findings showed statistically highly significant P-value=0.000001. In terms of marital status, both single and married respondents showedno menstrual changes concerning stress, with percentages of 55.4%, and 81% respectively. These results were highly significant, with P-value of 0.008. Furthermore, no menstrual changes were observed among the female students related to educational stress, whether, the respondent were from urban or rural areas, with percentages of 56.7%, and 55.4% respectively, but these findings were statistically non-significant with P-value=0.844.

Table 1: Sociodemographic characteristics of students

Characteristics	No N(%)	Yes n[%]	Total n[%]	*P-value*
Age				
Less than 20	190[63.5%]	109[36.5%]	299[100.0%]	
21 to 24	132[47.0%]	149[50.3%]	281[100.0%]	0.000001
More than 25	17[89.5%]	2[10.5%]	19[100.0%]	
Marital status				
Single	317[55.4%]	255[44.6%]	572[100.0%]	0.008
Married	22[81.0%]	5[18.5%]	27[100.0%]	
Address				
Urban	308[56.7%]	235[43.3%]	543[100.0%]	0.844
Rural	31[55.4%]	25[44.6%]	56[100.0%]	

In comparison between medical and non-medical students, the percentage of menstrual changes related to educational stress is slightly higher in medical students (43.6%) than non-medical students (43.0%). However this difference is statistically non-significant, as indicated by a P-value of 0.892. Regarding the study year of respondents, the highest level of menstrual changes was observed in the fourth stage (67.2%) while the lowest one was found in second stage (33.1%). The difference is statistically significant, with a P-value of 0.000001, as shown in Table 2.

Table 2: Relation between menstrual irregularities during exams in female medical and non-medical students according to study year

characteristics	No n[%]	Yes n[%]	Total n[%]	*P-value*
College				
Medical	299[56.4%]	177[43.6%]	406[100.0%]	0.892
Non-medical	110[57.0%]	83[43.0%]	193[100.0%]	
Study year				
First	141[61.3%]	89[38.7%]	230[100.0%]	
Second	87[66.9%]	43[33.1%]	130[100.0%]	
Third	69[53.1%]	61[46.9%]	130[100.0%]	
Forth	19[32.8%]	39[67.2%]	58[100.0%]	0.000001
Fifth	9[39.1%]	14[60.9%]	23[100.0%]	
Sixth	14[50.0%]	14[50.0%]	28[100.0%]	

According to Table 3 below, out of from 599 respondents, 516 of them had regular cycles, and the majority of them were not affected by educational stress (57.4%) The remaining 83 had menstrual irregularity which was not affected by stress (43%) which was statistically non-significant, with P-value of 0.343. Regarding the duration

of menstrual flow, both groups of respondents, whether they had 8 or fewer days of flow or more than 8 days of menstrual flow, were not affected by educational stress, with percentages of 56.5%, and 57.4% respectively, which was statistically non-significant with P-value of 0.896.
Concerning the perception of menstrual flow, all the respondents, whether they experienced light flow (>2 pads/day) or normal flow (2-4 pads/day) or heavy flow (<4 pads/day), reported not being significantly affected educational stress, with percentages of 72.9%,54.6%,52.7% respectively. The calculated P-value for these findings were statistically significant (P-value=0.14).

Table 3: Pattern of menstrual cycle among female college students

characteristics	No n[%]	Yes n[%]	Total n[%]	*P value*
Regularity of menstrual cycle				
Regular	296[57.4%]	220[42.6%]	516[100.0%]	0.343
Irregular	43[51.8%]	40[48.2%]	83[100.0%]	
Duration of menstrual flow				
Less or equal 8 days	304[56.5%]	234[43.5%]	538[100.0%]	0.896
More than 8 days	35[57.4%]	26[42.6%]	61[100.0%]	
Perception of menstrual flow				
Less than 2 pads per day	51[72.9%]	49[27.1%]	70[100.0%]	
2-4 pads per day	259[54.6%]	215[45.4%]	474[100.0%]	0.014
More than 4 pads per day	29[52.7%]	26[47.3%]	55[100.0%]	

Table 4 illustrates the types of irregularities during examinations stress., Out of 599 respondents, there are 76.5% who had no menstrual changes in stress while 61.5% have dysmenorrhea, 42.3% have heavy bleeding, 35.3% have oligomenorrhea, 54.2% use medications for these menstrual changes. All of these findings were found to be statistically highly significant, with a calculated P-value of 0.000001.

Table 4: Type of menstrual cycle changes during examinations according to menstrual history

Type of menstrual change	No n [%]	Yes n [%]	Totaln [%]	*P value*
No changes	179[76.5%]	55[23.2%]	234[100.0%]	
Oligomenorrhea	11[64.7%]	6[35.5%]	17[100.0%]	0.000001
Dysmenorrhea	104[38.5%]	106[61.5%]	270[100.0%]	
Heavy bleeding	45[57.7%]	33[42.3%]	78[100.0%]	

Discussion

In our study conducted at Diyala University, we examined the relationship between the stress of examinations and menstrual changes among students in all stages in both medical and non-medical faculties. The research also investigated the sociodemographic characteristics of students in relation to menstrual changes. Based on age group of respondents we found that higher percentage of menstrual changes occur in age group of 21-24 years old, while there were fewer occurrences of menstrual changes among students aged 25 years. This finding was statistically significant and agrees with Özder *et al.*[12], who found a high prevalence of menstrual changes in the age group of more than 20 years old students. Regarding marital status, we found that the majority of menstrual changes occurred in unmarried students, and this finding is statistically significant. This finding also agrees with Coombs *et al.*[13], who reported that stress prevalence is higher in single students and tends to decline after marriage.
In terms of the relationship between address and menstrual changes, our study found that most of the changes occurred in students living in rural areas. However, this finding is statistically non-significant. This also agrees with Jacob *et al.*[14], who studied the stress level in rural areas and found a higher prevalence of stress in females of rural areas. However, it disagrees with the findings of Prabu[15], who reported that urban student's academic stress is higher than rural students, which is statistically non-significant. Regarding the comparison of stress effects between medical and non-medical students our study found a slightly higher percentage in medical students, which is statistically non-significant. This finding is consistent with the results of Jafri *et al.*[16], who found higher stress levels among medical students which was statistically significant in their study. This study also showed the effect of the academic year on menstrual changes, and the findings revealed that more changes occurred in clinical years as compared to preclinical years. These findings corresponds with the previous study done by Sood *et al.*[17], who found no significant association between stress level and menstrual changes among preclinical medical students. However it disagrees with Sabirova *et al.*[18], who found that the first and last years of college have higher stress levels due to the need for adaptation and obtaining diploma respectively. This disagreement with our study can be attributed to the less number of professors and fewer learning facilities in our teaching hospitals, which mayinduce higher stress levels among clinical year students.
According to the pattern of the menstrual cycle and its relationship with stress, the majority of respondents have regular cycles in both stressful and non-stressful conditions,

and there's no effect of stress on menstrual regularity. However this finding disagrees with Yamamoto *et al*.[19], who found increased incidence of menstrual irregularities among students with higher stress scores in comparison with students with fewer scores. This discrepancy can be explained by higher stress levels among Japanese college students, along with increased deadlines and workloads.

Regarding the effect of stress on the duration and perception of menstrual flow among respondents, our study found that the majority of students have menstrual flow lasting less than 8 days in both stressful and non-stressful conditions. We did not observe any significant effect of stress on the duration of menstrual flow, which was statistically non-significant. This finding agrees with another study conducted by Alaskar *et al*.[20], who also found no correlation between stress level and duration of menstrual flow.

Regarding the type of changes that occurs in response to stress examinations, we found the most frequent change is dysmenorrhea which corresponds with a previous study done by Singh *et al*.[1]. They documented a significant association between increased stress scores and painful periods. This finding is also supported by the research of Katwal *et al*.[21], who found a linear correlation between stress levels and dysmenorrhea. This correlation can be explainedby theimpact of stress on the distribution of hypothalamus -pituitary-ovarian axis, leading to high cortisol levels that can affect the hypothalamus. This theory is supported by Septianingrum *et al*.[22], who found a significant association between cortisol levels and dysmenorrhea among nursing college students during examinations. Another menstrual change observed in our study was heavy bleeding and oligomenorrhea, indicating that stress can also affect the amount of menstrual blood. This finding, however, disagree with Nagma *et al*.[23], who reported no association between stress level and the amount of menstrual blood. This condition is explained by the author due to other causes rather than stress. The disagreement with our study may be due to differences between the number of respondents and unawareness of gynaecological problems in our society.

Conclusion

The study concluded that educational pressure is prevalent among medical students and that stress significantly contributes to changes in the menstrual cycle. Among the most common change in our study was dysmenorrhea. Furthermore, changes in the menstrual cycle occurred in students in the clinical years more than in the preclinical year. It was also noted that changes in the menstrual cycle among medical students were more prominent as compared to non-medical students due to higher levels of stress.

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