



Impacts of Dysmenorrhea and Premenstrual Syndrome on Academic performance and its relationship with Body Mass Index among Students attending Benha Faculty of Medicine

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ABSTRACT

Background: Dysmenorrhea and Premenstrual syndrome (PMS) are common problems among females. They affect many aspects of their daily activities, improper performance in college, and college absences. **Objectives:** To assess impact of dysmenorrhea and PMS on academic performance and to identify the association between dysmenorrhea and body mass index (BMI). **Method:** This cross-sectional study included 175 female students attending Benha faculty of Medicine between September 2022 to January 2023. Data was collected using a convenience sampling method through a self-administered online questionnaire which was composed of questions about menstruation and its characteristics, effects of menstruation on academic performance and its association with BMI, premenstrual syndrome and its impacts. **Results:** This study showed that 90.3% of participants suffer from dysmenorrhea, most of students (57.7%) had severe dysmenorrhea. There was statistically significant positive correlation between severity of dysmenorrhea and reduction of academic performance ($P=0.004$), reduction of social life activities / hobbies ($P<0.001$), affection of relationship with others ($P=0.012$), and duration of annual university absenteeism ($P<0.001$), with negative correlation with BMI. Most of participants suffer from mild premenstrual symptoms. **Conclusion:** Dysmenorrhea is highly prevalent among female attending Benha faculty of Medicine. There was negative impact of dysmenorrhea on academic performance. Therefore, there is need to enhance the students' awareness about menstrual pain and treatment approaches to reduce its negative impacts on the educational process.

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INTRODUCTION

Pain is an unpleasant sensation that negatively affects individual experiencing it, depending on its quality, intensity, location, and duration. One of the causes of pain among females is dysmenorrhea. Dysmenorrhea is defined as pain during menstruation. A significant population of females experience mild, moderate or severe pain during menstruation.¹ Primary dysmenorrhea is defined as dysmenorrhea with the absence of any organic pathology starting 6–12 months after the menarche and frequently continuing till menopause,² while secondary dysmenorrhea results from gynecologic problems such as

adenomyosis, endometriosis, uterine fibroid and others.³ Menstrual pain frequently begins a day or 2 days prior to menstruation and tends to end after 1 or 2 days of menstruation.⁴

Premenstrual syndrome presents with at least one affective symptom such as irritability, confusion, anxiety, depression, or social withdrawal. At least one somatic symptom (bloating in the abdomen, breast tenderness, headache, or swelling in limbs). Also, Dysphoric disorder characterizes by one or more of the following symptoms as mood swings, sudden sadness, increased sensitivity to rejection. Premenstrual

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symptoms manifest during the five days before menstrual flow and presenting in at least three consecutive menstrual cycles. Also, within four days of the onset of menses, symptoms should subside.³

Up to 80% of females with primary dysmenorrhea (PD) are estimated to experience the cyclic pain associated with PD at some point in their life. University students frequently experience primary dysmenorrhea, with prevalence rates ranging from 41.7% to 89.1% globally and the pain was rated as “severe” in 5%–20% of girls.⁵⁻⁶ In Egypt, a cross-sectional study of secondary school students in the Mansoura Governorate found that 75% of the students suffered from dysmenorrhea (mild made up 55.3%, moderate 30.0%, and severe 14.8%), and most of them chose not to seek medical attention.⁷ Primary dysmenorrhea has an impact on everyday tasks and work productivity. In addition, it has been recognized as the main reason why women of reproductive age miss work or school. Additionally, PD influences university students' academic performance.⁸

There have been numerous studies on the relationship between body mass index (BMI) and dysmenorrhea, but the findings have been mixed. Some studies have found no relationship between the two,⁹⁻¹⁰⁻¹¹ while others have found an increased prevalence of PD in underweight females,¹²⁻⁴ and other data is suggestive of a positive association between increased BMI and PD.¹³

The present study was created to close this knowledge gap regarding the effects of dysmenorrhea and PMS on academic performance among female students at Benha Faculty of Medicine. The existing data is inconclusive and insufficient to support a link between BMI and dysmenorrhea. The objectives of the study were to: 1) assess how PMS and dysmenorrhea affect female students' academic performance at Benha Faculty of Medicine; and 2) determine the relationship between dysmenorrhea and body mass index.

METHOD

This cross-sectional study recruited 175 females attending Benha Faculty of Medicine during the first term of the academic year 2022/2023 between September 2022 to January 2023. Data was gathered using a convenience sampling method through a self-administered online questionnaire. A Google form of Arabic Questionnaire was created. After giving

Table 1: Demographic features of participants and menstrual cycle characteristics

	Number (%) or Mean \pm SD (range)
Age (years)	23.37 \pm 1.15 (20-27)
Age at menarche (years)	12.6 \pm 1.37 (9-16)
Duration of menstruation (days)	5.22 \pm 1.16 (1-10)
Duration of dysmenorrhea during menstruation (days)	1.91 \pm 1.2 (1-10)
Regularity of menstruation	
Regular	140 (80.0)
Irregular	35 (20.0)
Presence of dysmenorrhea	158 (90.3)
Persistence of dysmenorrhea during menstruation	83 (47.4)
Severity of dysmenorrhea (n=158)	
Mild	13 (8.2)
Moderate	54 (34.1)
Severe	91 (57.7)

informed consent to participate in the study, participants completed and submitted the questionnaire. The survey was distributed through groups on Facebook and What's App, and repeated follow-up and reminder messages were employed to boost the response rate.

The minimum sample size (n=139) was calculated according to the below equation; where: $Z_{1-\alpha/2}$ is the standard normal variate at 5% type 1 error ($P < 0.05$) it is 1.96. P the expected prevalence based on previous studies (90%).³ d is the absolute error (0.05)

$$\text{Sample size} = \frac{Z_{1-\alpha/2}^2 P(1-P)}{d^2}$$

The used questionnaire was composed of 3 main sections as follows a) the first section included age, age at menarche, menstruation regularity, duration, presence of dysmenorrhea and its severity using Numeric pain relating scale, subjects were required to quantify their pain by a simple rating 0 indicates no pain, 1 to 3 is mild pain, 4 to 6 is moderate pain and 7 to 10 = severe pain,¹⁴ persistency and duration of dysmenorrhea, accompanying symptoms of dysmenorrhea include back pain, breast tenderness, nausea, diarrhea, vomiting, headache, decrease appetite, dizziness, constipation, migraine, painful defecation and painful urination, coping mechanisms for dysmenorrhea (herbs, hobbies, exercise, rest, hot pack, hot shower, analgesics, oral contraceptive pills, and intrauterine device) and family history of dysmenorrhea.³⁻⁸⁻¹⁵⁻¹⁶ b) The second section comprised

Table (2): Frequency distribution of accompanying symptoms of dysmenorrhea and coping mechanisms

Variables*	Number	%
Accompanying Symptoms		
Back pain	139	79.4
Breast tenderness	87	49.7
Nausea	88	50.3
Diarrhea	58	33.1
Headache	80	45.7
Decrease in appetite	82	46.9
Dizziness	72	41.1
Constipation	41	23.4
Migraine	32	18.3
Painful defecation	50	28.5
Painful micturition	35	20.0
Vomiting	45	25.7
None	6	3.4
Coping mechanism		
Herbs	39	22.3
Exercise	11	6.3
Rest	123	70.3
Hot shower	42	24.0
Hot pack	44	25.1
Analgesic	127	72.6
Oral contraceptive pills	2	1.1
Hobbies	9	5.1
None	15	8.6

*More than one answer was allowed

extent of dysmenorrhea's effects on the academic achievement, social life, relationships and body mass index (BMI). Annual university absence in days from dysmenorrhea, if they had visited a gynecologist and/or emergency department due to dysmenorrhea, doing a ultrasound and showing pathology that would cause dysmenorrhea.³⁻⁴⁻⁸ c) The third section included severity of premenstrual symptoms in terms of depressed mood, anxiety, mood swing, irritability, less interest in usual activities, lack of concentration, lethargy, insomnia/hypersomnia, increased appetite/food craving, unable to cope, abdominal bloating, breast tenderness, headache, and swelling of extremities, and the participants were asked whether they had these symptoms starting five days before menstruation and/or remitting 3 days during menstruation and they had the symptoms during more or less than three consecutive menstrual cycles. Consulting a physician about premenstrual symptoms, if the physician give treatment and if they benefited from the treatment. The degree to which premenstrual symptoms affect the academic performance, social life, and relationships. Annual

university absence in days owing to premenstrual symptoms.³⁻¹⁶⁻¹⁷

Statistical analysis: The data were analyzed using the Statistical Package for Social Science, version 20.0 for windows, (SPSS Inc, Chicago, IL). Qualitative data were summarized as frequency and proportion while quantitative data were presented as mean \pm SD. Appropriate statistical tests were used for comparison between the study groups as Fishers exact test, Kruskal-Wallis test and Spearman correlation test were used as tests of significance. P value \leq 0.05 was considered statistically significant.

RESULTS

A total of 175 female students completed the online questionnaire their mean age was 23.37 ± 1.15 , their mean age at menarche was 12.6 ± 1.37 , the mean duration of menstruation per cycle was 5.22 ± 1.16 . Eighty percent of participants reported regularity of menstruation and 90.3% had pain during menstruation. The average duration of dysmenorrhea during menstruation was 1.91 ± 1.2 . About 47.4% of participants reported persistence of pain during menstruation. Only 57.7% reported having severe pain (Table 1).

The distribution of accompanying symptoms for dysmenorrhea, were 79.4% of participants had back pain while 3.4% of participants reported not having any accompanying symptoms. The coping mechanisms for the pain, were 70% of participants had rest while 8.6% reported not having any coping mechanism (Table 2). There were statistically significant positive correlation between severity of pain and reduction of academic performance/productivity ($P=0.004$), reduction of social life activities/hobbies ($P<0.001$), affection of relationships with other ($P=0.012$) and duration of annual university absenteeism ($P<0.001$) (Table 3).

About 54.8% of participants reported annual university absenteeism due to dysmenorrhea. Only 9.1% reported visiting gynecologist/emergency department due to dysmenorrhea and 6.9% did ultrasound due to dysmenorrhea, 25.0% of them their ultrasound revealed pathology that cause dysmenorrhea. About 26.9% of students modified their coping mechanism during time, and 60.6% reported family history of dysmenorrhea. Also, 39.4% of participants had annual university absenteeism due

Table (3): Effects of severity of dysmenorrhea on academic performance, social life and annual university absenteeism

	Severity of dysmenorrhea			P value ¹	Spearman correlation	P value ²
	Mild N (%)	Moderate N (%)	Severe N (%)			
Reduction of academic performance/ productivity						
None	3 (23.1)	2 (3.7)	2 (2.2)	0.007	0.225	0.004
Mild	8 (61.5)	31 (57.4)	45 (49.5)			
Moderate	1 (7.7)	17 (31.5)	22 (24.2)			
Severe	1 (7.7)	4 (7.4)	22 (24.2)			
Reduction of social life activities/ hobbies						
None	3 (23.1)	5 (9.3)	3 (3.3)	0.005	0.296	<0.001
Mild	8 (61.5)	27 (50.0)	35 (38.5)			
Moderate	1 (7.7)	16 (29.6)	25 (27.5)			
Severe	1 (7.7)	6 (11.1)	28 (30.8)			
Affect relationships with other						
None	4 (30.8)	12 (22.2)	14 (15.4)	0.06	0.198	0.012
Mild	7 (53.8)	23 (42.6)	34 (37.4)			
Moderate	0 (0.0)	14 (25.9)	20 (22.0)			
Severe	2 (15.4)	5 (9.3)	23 (25.3)			
Average duration of annual university absenteeism						
Mean±SD (Range)	9.39±10.9 (0-40)			<0.001	0.337	<0.001

* P value¹ for difference was derived from Fisher Exact or Kruskal-Wallis test

to premenstrual symptoms with mean duration 16.42±8.5. About 6.2% of students consult physician about premenstrual symptoms and most of them 72.7% were given analgesics by physician and 45.5% benefit from the treatment given by physician (Table 4).

The distribution of premenstrual symptoms among the students were 48.6% had mild depressed mood, 42.3% had mild anxiety, 45.7% had mild mood swing, 44.0% had mild angry, 49.1% had mild less interested in usual activities, 45.7% had mild lack of concentration, 45.7% had mild lethargy, 36.6% had no increased appetite, 40.0% had mild insomnia/hypersomnia, 40.6% had mild overwhelmed/unable to cope and 44.6% had mild breast tenderness/breast swelling/weight gain/joint pain. The effects of premenstrual symptom were 41.1% had mild reduction of academic performance/ productivity, 40.0% had mild reduction of social life activities/hobbies and 37.1% had mild interference with relationships with other (Table 5).

Table (6) demonstrates that there were statistically significant differences between severity of pain and BMI ($P < 0.001$), it shows that the percentage of students having moderate and severe dysmenorrhea is higher in students having low BMI as compared to overweight and obese students.

DISCUSSION

Dysmenorrhea and premenstrual syndrome affect many females either physically, mentally, or emotionally. In this study we looked at the effect on their academic performance during these stressful events and the relationship with BMI. It is well known that menstrual disorders are estimated to afflict almost 2.5 million women annually.¹⁸

This study showed that dysmenorrhea, which affects more than half of the participants and has an impact on both their social lives and academic performance, is a highly frequent issue among university students. In this study, dysmenorrhea was 90.3% common. These findings are in accordance with other studies indicating that 16–90% of young females suffer from dysmenorrhea.²⁻⁹ According to a systematic review conducted by the World Health Organization using 106 papers, the prevalence of dysmenorrhea varies between 16.8% and 81%, with lowest rate in Bulgaria (8.8%) and highest in Finland (94%).¹⁹ Additionally, 92.9% of 1908 female students at Egypt's Beni-Suef University were found to have dysmenorrhea in the study.²⁰ It was reported that the prevalence of dysmenorrhea among secondary school female students at Assiut City, Egypt was 77.3%.²¹ The variation in dysmenorrhea prevalence among studies can be explained by many factors, as the variations in

Table (4): Frequency distribution of the studied group regarding annual university absenteeism and other variables due to dysmenorrhea and premenstrual syndrome

Variables	Number	%
Dysmenorrhea		
Annual university absenteeism due to dysmenorrhea	96	54.8
Visiting gynecologist/emergency department due to dysmenorrhea	16	9.1
Doing ultrasound due to dysmenorrhea	12	6.9
Ultrasound reveal any pathology that cause dysmenorrhea	3	25.0
Changing coping mechanism in the course of time	47	26.9
Family history of dysmenorrhea	106	60.6
Premenstrual Syndrome		
Annual university absenteeism due to premenstrual symptoms	69	39.4
Average duration of annual university absenteeism (Mean±SD)	16.42±8.5 (1-48)	
Consulting physician about premenstrual symptoms	11	6.2
Treatment given by physician		
Analgesics	8	72.7
Antispasmodics	1	9.1
Vitamins	2	18.2
Benefit from the treatment given by physician	5	45.5

sociocultural, ethnic characteristics, differences in lifestyle, variation in subjective perception of pain, genetic factors, and lack of a universally accepted method of identifying dysmenorrhea.⁸

Regarding accompanying symptoms of dysmenorrhea, it was found that the most prevalent symptom was backache (79.4%), which is similar to study conducted in Beni-Suef university, that discovered 65.7% of participants reported backache.²⁰ Considering the severity of dysmenorrhea, it was reported that 8.2% had mild, 34.1% had moderate and 57.7% had severe dysmenorrhea. In contrast to these finding Al-Zahrani et al who found that the majority of nursing students had moderate dysmenorrhea 60.4%, while 21.6 had severe dysmenorrhea, and few had of mild menstrual pain.¹⁵ Also, Rafique, and Al-Sheikh reported that 12.7% suffered mild dysmenorrhea, 65.6% moderate dysmenorrhea, and 8.4% having severe dysmenorrhea.² The reasons for this discrepancy of the current study from other studies could be due to the difference in the standard definition of dysmenorrhea and subjective assessment

of pain in the absence of a physical means to measure pain.

One of the most prevalent causes of absenteeism in young females is primary dysmenorrhea.⁸ In this study, 54.8% of the students reported college absence because dysmenorrhea, also, the students reported that dysmenorrhea negatively affected their academic performance ($P=0.004$), social life ($P<0.001$) and their relationship with others ($P=0.012$). There was poor academic performance due to lack of concentration from the pain, inability to attend in college due to absenteeism because of pain. Like this, other studies also found that menstrual disorders led to school absenteeism, problems in social life, and decrease in academic performance. In previous studies absenteeism varied from 18.6% to 80.6% among university students.²²⁻²³⁻²⁴⁻²⁵⁻²⁶

Analgesics were shown to be the most popular means of pain relief (72.6%) in this study, which is similar to the findings of Zahradnik et al., who reported that NSAIDs are the most efficient first-line treatment for dysmenorrhea.²⁷ Additionally, Rafique and Al-Sheikh reported that the usage of NSAIDs reduced pain in 55.8% of participants.²

The present study revealed that underweight students have a significantly higher dysmenorrhea ($P<0.001$). These findings are line with previous studies, showing a significant association between dysmenorrhea and low BMI.²⁻⁴⁻¹²⁻²⁶ The exact pathophysiological mechanisms responsible for this finding are unclear. As certain amount of body fat is important for normal ovulation and menstrual cycles, and small amount of fat can lead to ovulatory, menstrual and reproductive problems. Also, it is hypothesized that disturbed ovulation and irregular menstruation can lead to changes in estrogen/progesterone ratio, leading to higher prostaglandin production and so dysmenorrhea.²⁸⁻²⁹ In contrast to this finding Snehalata et al. who reported a positive association between dysmenorrhea and increased BMI and revealed that severity of dysmenorrhea increased by increasing weight and increasing BMI in subjects.¹³ This study revealed that the majority of participants were having PMS, which is similar to Manandhar et al, who reported that most of participants (84.0%) were experiencing PMS.³⁰ This study showed that depressed mood, lack of concentration and lack of interest in

Table (5): Frequency distribution of the studied group regarding severity of premenstrual symptoms and its effects on academic performance and social life

Possible effects	Severity of premenstrual symptoms			
	None	Mild	Moderate	Severe
Depressed mood	9 (5.1%)	85 (48.6%)	48 (27.4%)	33 (18.9%)
Anxiety/tension	22 (12.6%)	74 (42.3%)	54 (30.9%)	25 (14.3%)
Mood swing	16 (9.1%)	80 (45.7%)	46 (26.3%)	33 (18.9%)
Angry/irritable	21 (12.0%)	77 (44.0%)	47 (26.9%)	30 (17.1%)
Less interested in usual activities	11 (6.3%)	86 (49.1%)	50 (28.6%)	28 (16.0%)
Lack of concentration	29 (16.6%)	80 (45.7%)	46 (26.3%)	20 (11.4%)
Lethargic/tired/lack of energy	12 (6.9%)	80 (45.7%)	47 (26.9%)	36 (20.6%)
Increased appetite/food craving	64 (36.6%)	50 (28.6%)	35 (20.0%)	26 (14.9%)
Insomnia/hypersomnia	45 (25.7%)	70 (40.0%)	40 (22.9%)	20 (11.6%)
Overwhelmed/unable to cope	49 (28.0%)	71 (40.6%)	41 (23.4%)	14 (8.0%)
Breast tenderness/breast swelling/weight gain/joint pain	33 (18.9%)	78 (44.6%)	43 (24.6%)	21 (12.0%)
Reduction of academic performance/ productivity	39 (22.3%)	72 (41.1%)	44 (25.1%)	20 (11.4%)
Reduction of social life activities/ hobbies	40 (22.9%)	70 (40.0%)	46 (26.3%)	19 (10.9%)
Interfere with relationships with other	50 (28.6%)	65 (37.1%)	34 (19.4%)	26 (14.9%)

Table (6): Relationship between BMI and dysmenorrhea

BMI groups	Severity of dysmenorrhea				Fisher Exact	P value	Spearman correlation	P value
	No N (%)	Mild N (%)	Moderate N (%)	Severe N (%)				
Underweight	1 (5.9)	0 (0.0)	23 (42.6)	50 (54.9)	48.67	<0.001	-0.167	0.027
Normal	14 (82.4)	11 (84.6)	22 (40.7)	15 (16.5)				
Overweight	2 (11.8)	2 (15.4)	7 (13.0)	24 (26.4)				
Obese	0 (0.0)	0 (0.0)	2 (3.7)	2 (2.2)				

usual activities were the most symptoms of PMS bothering females during the study. It was discovered that only 9.1% of women with severe dysmenorrhea sought medical advice, and many of them didn't alter their coping mechanisms to reduce pain and enhance their quality of life. In addition to the coping techniques used by our participants, there are many others that can be used, and getting medical help as soon as possible can be crucial because it will affect both academic and social performance as well as absenteeism.

This study has some limitations regarding diagnosis of PMS and dysmenorrhea was on basis of history only no medical examination or investigations were done. Also, this study was a cross sectional, so we couldn't found out the effects of increasing and decreasing BMI on dysmenorrhea, or effects of dysmenorrhea on changes in academic performance across terms. So, further studies should be prospective and using PMS charts or PMS records for 3 consecutive months.

Only medical students sharing in the study may be point of power for the study for being highly educated

but on the other hand may be point of weakness for other females not to be represented in the study.

CONCLUSIONS

No doubt that dysmenorrhea and PMS affect females' life in many ways and affect their social life and academic performance, many coping mechanisms can help females, but many don't seek these methods for unknown etiology. This study revealed that those with low body fat are more likely to experience severe dysmenorrhea and more prone to more discomfort during their periods.

Ethical consideration: An electronic informed consent was provided by all participants after clarification the aims, methods, benefits, and data confidentiality. An approval from the Research Ethics Committee in Benha Faculty of Medicine was obtained to conduct this work (RC 4-10-2022).

Recommendation: To assist women during these stressful menstruation periods, effective strategies should be used to raise women's awareness and stop

them from delaying seeking medical advice. Prospective methods for diagnosis of PMS such as PMS charts and PMS records should be employed. Coping mechanisms are more and should be discussed fairly to help women to cope up with these stressful events.

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Availability of data and material: the datasets used are available from the corresponding author on reasonable request.

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