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RESEARCH ARTICLE

Prevalence and Impact of Dysmenorrhea on the Academic Performance of Students at Medical and Health Sciences University

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Abstract:

Introduction:

Dysmenorrhea is painful menstruation and is the most common menstrual symptom affecting adolescents. Evidence suggests that worldwide prevalence can be high and can significantly affect academic performance through its impact on activity, absenteeism, and other aspects of learning.

Materials and Methods:

This is a cross-sectional survey using a pre-validated questionnaire incorporating demography, menstrual history, severity, and effects on academic performance. Female students selected by non-probability sampling of Ras al Khaimah Medical and Health Sciences University were included (calculated sample size=249).

Results and Discussion:

A total of 252 students participated (mean age 20.14 years). The prevalence of dysmenorrhea was 80.5%. Pain was severe for 25.1% (≥7/10 score),14.7% reported severely restricted daily activity, 66% received regular treatment, and 24(11.8%) required hospitalization during the last year due to pain. More than 50% of students missed academic sessions, 68% had trouble concentrating, 70. 4% were unable to study. 59% had an inability to complete assignments, 58% had trouble concentrating during examinations, and 8.8% missed assessments due to dysmenorrhea. The majority missed 1-2 days each month. Dysmenorrhea was a significant predictor of academic domains (AD) like reduced concentration, inability to complete assignments, missing lectures, and assessments [adjusted OR-2.25, 5.57, 4.32, 3.96] with p less than .05 in each. Moderate to severe pain was an independent predictor of all AD compared to mild pain (score less than 3) (p=.026). Moderate to severe dysmenorrhea had a significant negative impact on academic performance (p=.02).

Conclusion:

Dysmenorrhea is a prevalent health problem among university students and has a significant negative impact on education.

Keywords: Dysmenorrhea, Painful menstruation, Academic performance, Medical and health sciences university, Assessment, Absenteeism.

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1. INTRODUCTION

Dysmenorrhea, or pain with menses, is a common complaint in adolescents. Primary dysmenorrhea (PD) is defined as painful menstruation in the absence of pelvic pathology and is usually present since the onset of menstruation. Secondary dysmenorrhea (SD), on the other hand, is a manifestation of underlying pelvic pathology and typically occurs 12 months after establishing a menstrual cycle [1].

PD is the most common menstrual symptom affecting adolescent women [2]. Lower abdominal pain or pelvic pain is a typical presenting symptom of dysmenorrhea in adolescents. It is experienced as a sharp, intermittent spasm in the suprapubic region, often radiating to the back of the legs. Headache, nausea, and vomiting can accompany the pain as well. The pain typically presents 1 to 2 days prior to the onset of menstrual flow and can last anywhere from 8 hours to 96

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hours into menses. The severity of pain and associated symptoms positively correlate with the onset of ovulatory cycles and with increased duration and amount of menstrual flow [3]. PD has been linked to prostaglandins. Other risk factors associated with PD include caffeine consumption, low fish consumption, and cigarette smoking [3 - 6]. Pain occurring outside of menses may be due to secondary causes and would warrant further investigation. Ten percent of adolescents may experience SD. SD is more likely to be associated with chronic pelvic pain (CPP), dyspareunia, and irregular menstrual bleeding. Among the several causes of SD, endometriosis is one of the most common ones [1].

In the world, the estimated prevalence of dysmenorrhea ranges from 45% to 93% of women of reproductive age, with adolescents having the highest rates of dysmenorrhea [7 - 12]. Studies suggest that approximately 140 million hours are lost annually from school or work owing to dysmenorrhea. It is a leading cause of recurrent short-term school absenteeism, lack of concentration, no active participation, inability to do homework, failure in an exam, and limitation of activity [13, 14]. An estimated 15% of adolescent females describe their pain as severe, impacting their quality of life. These adolescents can miss 1 to 3 days of school per menstrual cycle [15]. Studies have noted that dysmenorrhea can lead to lower academic performance (AP) and poor quality of sleep, resulting in mood changes, such as anxiety and depression [13, 16 - 23]. Despite being a significant health concern, little attention has been given to the impact of dysmenorrhea on the AP of students [24]. There are few studies in the Gulf region exploring this issue, but none in the United Arab Emirates (UAE) to specifically highlight its impact on the students of medical and health sciences University [25 - 29]. Hence, the objectives of this study were to determine the prevalence of dysmenorrhea among students in a Medical and Health Science University and to determine the impact of dysmenorrhea on AP. The research findings are likely to help create awareness about dysmenorrhea, help adolescents develop coping strategies, and seek advice when required.

2. MATERIALS AND METHODS

2.1. Study Design and Period

This was a cross-sectional questionnaire-based study that was conducted among the students of RAK Medical and Health Sciences University (RAKMHSU) at Ras al Khaimah (RAK), UAE, between December 2022 and March 2023.

2.2. Study Setting and Population

This study was conducted among different constituent colleges of Ras al Khaimah Medical and Health Sciences University (RAKMHSU) as RAK College of Medical Sciences (RAKCOMS), RAK College of Dentistry (RAKCOD), RAK College of Nursing (RAKCON), and RAK College of Pharmacy (RAKCOP). RAK is one of the Northern Emirates and is the farthest from the capital city, Abu Dhabi. RAKMHSU is the first comprehensive health sciences university in the UAE and the only one at RAK that is entirely run by the government.

2.3. Inclusion and Exclusion Criteria

All female students of the University were included in the study.

Students diagnosed with conditions like endometriosis, adenomyosis, fibroids, and CPP were excluded from the subgroup of PD [30]. Again, girls with a menstrual history suggesting SD were excluded from the PD subgroup, and they were advised to consult a gynecologist for further management.

2.4. Sample Size and Sampling

The sample size was calculated using Sample Size Calculator software available at Calculator.net. RAKMHSU consists of approximately 700 female students. Considering a prevalence of approximately 50% from other studies, taking a 95% confidence level with a 5% margin of error, the calculated sample size was 249, which needed to be recruited to generate adequately sized subgroups to ensure the statistical robustness of analyses. Considering the number of refusals, non-responders, and incomplete submissions, all female students were approached by non-probability sampling for consent, and the questionnaire was sent.

2.5. Assessment Tool

The validated dysmenorrhea and AP impact questionnaire in English was used for the survey. The questionnaire contained sections on demography, menstrual history, dysmenorrhea history, and impact on AP. It had 34 items with both short, open-ended and closed-ended questions.

We followed an existing guideline for developing the questionnaire [31]. The initial version of the questionnaire was prepared after a review of the relevant literature [25, 26, 32 - 37]. It contained 39 items (Questionnaire version 1). We invited faculty members (N=10) from the institution to screen the questionnaire for content. We then invited 10 students to test the questionnaire for general readability and comprehension. The final version of the questionnaire with 34 questions, after pilot testing, was used for this study (Questionnaire version 2). We tested the overall reliability of motivational items in dysmenorrhea and impact questions, and the Cronbach α obtained was between 0.76-0.81, suggestive of acceptable internal consistency. There were questions with options of Yes- always, Yes- often, Yes- sometimes, Yes- rarely, and Never. In these questions, the first three were included as positive responses, and the latter two (Yes-rarely and Never) were considered as negative responses. The verbal multidimensional scoring system (VMS) was used for categorizing Dysmenorrhea into Mild (Grade 1), Moderate (Grade 2), and Severe (Grade 3), considering the severity of pain, effect on daily activity, systemic symptoms, and analgesic use [37].

2.5.1. Grade 0

Menstruation is not painful, and daily activity is unaffected. Analgesics are not required.

2.5.2. Grade 1

Menstruation is painful but seldom inhibits the normal

activity of women. Analgesics are seldom required. (Mild pain, activities rarely affected, no systemic symptoms, and analgesics rarely required).

2.5.3. Grade 2

Daily activity affected. Analgesics are required and give relief so that absence from work or school is unusual. (Moderate pain, activities moderately affected, few systemic symptoms, and analgesics required).

2.5.4. Grade 3

Activity clearly inhibited. Poor effect of analgesics. Vegetative symptoms, *e.g.*, headache, tiredness, nausea, vomiting, and diarrhea. (Severe pain, daily activities clearly inhibited, apparent systemic symptoms, and poor effects of analgesia).

2.6. Data Analysis

The Statistical Package for Social Sciences (SPSS) version 25.0 was used for data analysis. Descriptive statistics (percentages, mean) and univariate analysis were used to describe the characteristics of the respondents. A bivariate analysis using a chi-square test and odds ratio was done for the comparisons, and a multivariate analysis was done for assessing the strength of the association. In our study, we considered a p-value less than 0.05 as significant.

3. RESULTS

3.1. Demographic Details

A total of 252 students from the constituent colleges participated in the survey. The mean age of participants was 20.14 years, and the majority of them were first-year students (27.5%), closely followed by third-year students (Table **1**).

3.2. Menstrual Characteristics and the Prevalence of Dysmenorrhea

The mean age of menarche was 12.13 years among the participants. The majority of participants had normal menstrual cycles with an average duration of bleeding between 4-5 days (48.4%), regular cycles, and a moderate amount of flow (78.5%). There were 7 students with heavy menstrual bleeding characterized by more than 7 days of bleeding and passage of clots. They did not report any pain during menses. The prevalence of dysmenorrhea was found to be 80.5% (n=203). On the Numerical Rating scale (NRS), moderate to severe pain was felt by 66% of subjects (n=134). Most of the participants had experienced menstrual pain at more than one site (n=188), although the most common site was the lower abdomen (88%) (Table **2**).

Table 1. Demographic details.

Parameter	Values (n=252)	-
Age in years	Mean 20.14 ± 2.69 years	Range (18-24 years)
Year of Study	1st year	26.5% (n=67)
	2nd year	19.4% (n=49)
	3rd year	25% (n=63)
	4th year	10.7% (n=27)
	5th year	18.2% (n=46)

Table 2. Menstrual characteristics and prevalence of dysmenorrhea.

Parameter	Values (n=252) (%)	-
Age of menarche in years	12.13 ± 1.38	Range (9-16years)
Duration of menses in days	>7 days (n=12) (4.7) 6-7 (n=109) (43.2) 4-5 (n=122) (48.4) <3 (n=9)	Those with bleeding for more than 7days or reported heavy bleeding were included only if no cause was diagnosed
Regularity of cycle	Regular (n= 216) (85.7) Irregular (n= 36) (14.3)	
Amount of bleeding	Heavy (n=47) (18.6) Moderate (n=198) (78.5) Light (n=7) (2.7)	
Passage of clots (size of coin)	Yes (n=7) (2.7) No (n=245) (97.3)	These 7 students did not report pain during periods. They were referred to a gynecologist
Pain during menses	Yes (n=203) No (n=50)	Prevalence of dysmenorrhea 80.5%
Intensity of pain (Dysmenorrhea)	Mild (score <3) (n=69) Moderate (score 4-6) (n=83) Severe (score ≥ 7) (n=51)	Pain score on 10-point NRS on 203 participants

(Table 2) contd.....

Parameter	Values (n=252) (%)	-
Site of pain	Lower abdomen - 88% Back- 69% Thighs- 27% Legs- 25%	Pain at more than one site (92.6%)

Note: [NRS= Numerical Rating Scale].

Table 3. Effects of dysmenorrhea on quality of life.

Parameter	Values (n=203)	Additional Findings
Severity of dysmenorrhea	• Mild (Grade 1) (n=91) • Moderate (Grade 2) (n=83) • Severe (Grade 3) (n=29)	VMS was used for severity grading
Pain management	• Bed rest (n=176) • Heating pad (n=118) • Over-the-counter medications (n=108) • Prescribed medications (n=32) • Others (Tea/ Herbs/ Yoga) (n=105)	-The majority of participants used more than one method for pain relief -Medications include analgesics and COCs
Have you consulted a physician about the pain?	• Yes (n= 134) • No (n= 69)	Participants with moderate and severe pain are more likely to seek help (p=.002)
Have you ever been hospitalized for menstrual pain?	• Yes (n=24) (11.8%) • No (n=179)	-5.4% were hospitalized more than once in last year

Note: [COC= Combined Oral Contraceptive Pills; VMS= Verbal Multidimensional Scoring system].

3.3. Effect of Dysmenorrhea on Quality of Life

Among the participants who reported dysmenorrhea (n=203), 14.7% reported severely restricted daily activity, but the majority had Grade 1 Dysmenorrhea, which seldom affects daily activities. For the management of pain, 87% were receiving regular treatments, including bed rest, relaxation exercises, listening to music, herbal preparations, local use of heating pads, over-the-counter (OTC) analgesics, prescribed analgesics, and combined oral contraceptive pills. Most of the participants with moderate to severe pain used all of these or in combination, whereas those with mild pain mostly used non-pharmacological methods. None of the participants used pain devices. About 24 subjects required hospitalization during the last year due to pain (11.8%) (Table **3**).

3.4. Impact on Academic Performance

Among the participants (n=252), almost 34.5% (n=87) thought that dysmenorrhea negatively impacts the AP of students. It was found that females with Grade 3 dysmenorrhea are significantly more likely to perceive the negative impact on academics than those with Grade 1 dysmenorrhea by VMS [p=.0005]. More than 50% of girls with dysmenorrhea agreed to have missed lectures and/or other academic sessions due to menstrual pain. More than 550 academic sessions were missed by the participants in total over the past academic year due to pain, and most of them agreed to have missed sessions mostly on the first or second day of menses. 85.7% (n=174) of participants with dysmenorrhea had trouble concentrating in academic sessions due to menstrual pain. Similarly, 75% reported an inability to actively participate in class, 83.7% had a lack of motivation, and 75% of participants were unable to study or had difficulty following the study plan due to menstrual pain.

The effect on assessment was assessed by inability to complete an assignment/ homework, difficulty focusing during an exam due to menstrual pain, difficulty focusing in an examination, and missing examination. Although only 8.8% (n=18) reported missing an examination due to pain and the majority missed only 1 to 2 examinations in the last academic year, the inability to complete an assignment and inability to focus on the examination were reported to be 59% and 58%, respectively (Table **4**).

Table 4. Effects of dysmenorrhea on academic performance.

Questions	Response (n= 203)	Comments
Do you think your menstrual pain has a negative effect on your education?	●Yes (n= 87) ●No (n= 94) ●Maybe (n= 71)	This also included those without dysmenorrhea
Have you ever missed a lecture/ session due to menstrual pain?	●Yes (n= 103) ●No (n= 100)	-Mean 4.64±1.2 lectures were missed -50.7% of participants missed sessions
If yes, how many lectures have you missed in the past academic year due to menstrual pain, approximately	●1 to 2 (n= 40) ●3 to 4 (n= 20) ●5 to 9 (n= 29) ●10 or more (n= 14)	

(Table 4) contd.....

Questions	Response (n= 203)	Comments
Do you have trouble concentrating in lectures due to menstrual pain?	●Yes, always (n= 36) ●Yes, often (n= 41) ●Yes, sometimes(n= 62) ●Yes, rarely (n= 35) ●Never (n= 29)	Dysmenorrhea was a predictor of trouble concentrating [adjusted OR-2.25, p=.02]
Do you find yourself unable to actively participate in class due to menstrual pain?	●Yes, always (n= 36) ●Yes, often (n= 37) ●Yes, sometimes(n= 49) ●Yes, rarely (n= 31) ●Never (n= 57)	60% of participants had restricted participation
Do you lack the motivation to study due to menstrual pain?	●Yes, always (n= 54) ●Yes, often (n= 43) ●Yes, sometimes(n= 46) ●Yes, rarely (n= 27) ●Never (n= 33)	70.4% reported a lack of motivation
Do you find you are unable to study or it is difficult to follow your study plan due to menstrual pain?	●Yes, always (n= 31) ●Yes, often (n= 33) ●Yes, sometimes(n= 50) ●Yes, rarely (n= 39) ●Never (n= 60)	56.1% of participants were unable to study or had difficulty following the study plan
Have you ever missed an assessment/ examination due to menstrual pain?	●Yes (n= 18) ●No (n= 185)	8.8% have missed at least one exam/ assessment
Have you ever been unable to complete an assignment/homework due to menstrual pain?	●Yes, always (n= 21) ●Yes, often (n= 32) ●Yes, sometimes(n= 34) ●Yes, rarely (n= 33) ●Never (n= 95)	-59% reported inability to complete - adjusted OR-5.57, p=.001
If yes, how many assessments/ examinations have you missed in the past academic year due to menstrual pain, approximately?	●1 to 2 (n= 14) ●3 to 4 (n= 1) ●5 or more (n= 3)	-adjusted OR-3.96, p=.001
Have you ever found it difficult to focus/ unable to answer in an exam due to menstrual pain?	●Yes, always (n= 14) ●Yes, often (n= 19) ●Yes, sometimes(n= 47) ●Yes, rarely (n= 38) ●Never (n= 85)	58% reported an inability to focus during an examination

Dysmenorrhea was a significant predictor of academic domains (AD) like reduced concentration [adjusted OR-2.25, p=.02], inability to complete assignments [adjusted OR-5.57, p=.001], missing lectures/ session [adjusted OR- 4.32, p=.007] and assignments [adjusted OR-3.96, p=.001]. Moderate to severe pain was an independent predictor of all AD compared to mild pain (score<3) (p=.026). Moderate to severe dysmenorrhea had a significant negative impact on AP (p=.02). Absenteeism from lectures and assessments correlated with severe dysmenorrhea compared to those with no pain p=.001.

4. DISCUSSION

Menarche is a physiological change in females and is generally perceived as a welcome change. Dysmenorrhea can have a significant impact on various aspects of life, including AP, at this younger age. The study population in our study had a mean age of 20.14 ± 2.69 years. This is in accordance with the study in Saudi Arabia (Mean age 21 years) but in contrast to studies in Kuwait with a mean age of 17.4 years and in UAE with 15.18 years, as they were done in school children [25].

Exploring the menstrual characteristics of the participants, the mean age of menarche was 12.13 years. This is in accordance with the previous studies [25 - 27, 32, 38]. The majority of our participants had regular cycles (85.7%) as opposed to the findings of Al-Matouq *et al*. (48.1), Dahlawi *et al* (70.4%), and others [39]. This can be because our study was done in a medical and health sciences University with an older age group with age-related maturation of the hypothalamic-pituitary-ovarian axis (HPO). Menstrual flow for more than 7 days and perception of heavy flow were seen in only 4.7% and 18.6% of participants, respectively, in our study, as we had tried to exclude females with preexisting known gynecological diseases from the study, including only those with PD. The perception of heavy flow was only 11.6% in the study by Dahlawi *et al*. [26] but was much higher in other studies, with 28.7% [32], 29.9% [40], and 31% [25]. These studies did not exclude females with SD. The prevalence was high (80.5%) in this study. In a similar study by Al-Matouq *et al*. in Kuwait among students of twelfth standard, the prevalence was reported to be 85.6% [25]. As the majority of participants in our study were first-year students, the population is comparable. There are few other studies that reported various prevalences of dysmenorrhea between 16% to 93% (De Sanctis *et al*.), 92% (Dahlawi *et al*.),94.7% (Mulla *et al*.), 85% (Hailemeskel *et al*.), 55% (Patel *et al*), 63% (Unsal *et al*), and others [9, 11, 13, 26, 32, 33, 41 - 52]. The variation in the prevalence of dysmenorrhea across studies may be attributed to various reasons, such as sociocultural and ethnic differences, lifestyle factors, differences in the subjective perception of pain, and the lack of a universally accepted method of identifying PD [24]. In a few similar studies exploring the risk

factors for dysmenorrhea, the body mass index (BMI) and age of menarche were found to be significantly associated with dysmenorrhea ($p<.05$) [25, 53, 54]. Having an irregular menstrual period was negatively associated, and the flow of the menstrual period was positively associated with dysmenorrhea [25, 55 - 61]. Another study in France reported early menarche, heavy menstrual bleeding, low BMI, and the presence of CPP as risk factors for dysmenorrhea, with the prevalence being 92.9% [62]. However, our study did not explore the risk factors for dysmenorrhea.

The severity of pain can be assessed with various scales, while the verbal rating scale (VRS) is commonly used on a scale of 1 to 10 [63]. In a study by Teherán 2018, working ability, location, intensity, days of pain, and dysmenorrhea [WaLIDD] score were proposed to predict medical leave among these students with dysmenorrhea [64]. It was shown that a score of ≥ 6 has a high predictive value to discard the event in those with scores below the calculated cutoff point, compared to the subscales of the VRS [64]. Although absenteeism is an important factor contributing to AP, other variables like lack of concentration, inability to complete assignments, and inability to follow study plans can significantly influence it [2, 10, 13, 45, 65, 66]. However, WaLIDD did not explore the comprehensive effect on other parameters of AP. Another study comparing verbal rating scales (VRS) with numerical rating scales (NRS) reported that intensity categories of mild, moderate, and severe pain on the NRS were 1 to 3, 4 to 6, and 7 to 10, respectively [67]. They also reported that the ability to place the VRS category within the cut-off point ranges on the NRS was best with medical students (95.2% *vs*. 66.7 - 82.1%; $x^2 = 10.1$; df = 4; p-value = 0.0387) [67]. Therefore, we used both VMS and NRS for the severity of dysmenorrhea. The severity assessment by VMS matched the NRS for mild to moderate dysmenorrhea. However, there was a significant mismatch between severe pain (Score ≥ 7) and grade 3 dysmenorrhea ($p=0.03$). It was found that 14.7% of the participants experienced severe restriction of activity. Similar results were found by De Sanctis *et al* (2-29 %) and Zannoni *et al* (13%) [9, 10]. However, in other studies, the rates were higher at 33% [11, 32]. The latter studies did not exclude SD. Hence, the effect of the pathologies behind the SD on severity perception and response to treatment is likely to influence the restriction of daily activities. Self-management was practiced by 88% of the participants, and 11% relied on prescribed medications in this survey. These results are similar to other studies [9, 68 - 72]. Other therapies like yoga, exercise, and herbal preparations were used by 51.7% of females in our study and were mostly effective alone in mild pain but not in moderate to severe pain. Herbal preparation was found to be as effective as Ibuprofen in a previous study for the treatment of menstrual pain [73].

In our study, 40.8% of affected females strongly perceived that dysmenorrhea had a negative impact on their AP. This was consistent with other studies [2, 10, 13, 65, 74, 75]. Some of the effects of dysmenorrhea were: inability to study (56.1%), significant trouble concentrating due to pain (68.4%), inability to participate in activities (60%), inability to complete an assignment (61.3%), lack of motivation (70.4%), and difficulty in performing well in an exam (59%). Absenteeism was directly correlated with the severity of dysmenorrhea ($p=0.001$). This was in line with other studies [2, 10, 13]. It was noted that 62% of participants found it difficult to perform daily activities and were unable to concentrate [76]. Hailemeskel *et al*. reported a similar reading of 66.8%, whereas Ishikura *et al*. reported a much lower reading of 42% [2, 13]. A total of 59% of the participants faced difficulties performing well in exams, which in contrast with Ishikura *et al*. (41%) and Hailemeskel *et al*. (14.2%) is significantly higher [2, 13].

CONCLUSION

Our data suggest that dysmenorrhea is a highly prevalent public health problem among female university students, having a significant negative impact on their AP. Therefore, there is a need to raise awareness among the stakeholders about the effects of dysmenorrhea on AP in order to facilitate psychological and academic guidance to students and provide appropriate management referrals.

LIST OF ABBREVIATIONS

PD	=	Primary Dysmenorrhea
SD	=	Secondary Dysmenorrhea
CPP	=	Chronic Pelvic Pain
AP	=	Academic Performance
BMI	=	Body Mass Index
VRS	=	Verbal Rating Scale

ETHICAL STATEMENT

The study was approved by the Institutional Research and Ethics Committee of RAKMHSU (RAKMHSU-REC-113-2022/23-UG-M). Written consent was obtained from the students.

CONSENT FOR PUBLICATION

Participants were provided with a survey form and a *link via* email, before which a consent form was attached. Participation was voluntary, and submission of the form indicated consent.

STANDARDS OF REPORTING

The study was anonymous and did not contain any identifiable information in it. STROBE guidelines were followed.

FUNDING

None.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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Declared none.

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