ORIGINAL ARTICLE

Prevalence and impact of dysmenorrhea among high school students in Saudi Arabia

Mashael Obaid F. Alsaadi[1], Abdullah M. Alshahrani[2], Munirah Ayidh Aldhalaliah[1], Maria Abdulaziz Alrafi[3], Dalia Alqarni[1*], Aisha Ibrahim N. Alzoghaibi[3], Alhanouf Shaya Aldayili[3], Basma Mohammad Alghamdi[3], Dania Ahmed A. Farhan[4], Leen Mohamed Sayed[3], Zainab Mohamed Rizaan[3]

ABSTRACT

Background: Dysmenorrhea is a pervasive gynecological condition among adolescent girls globally, yet its specific burden within Saudi high school populations remains inadequately quantified. This study aimed to determine the prevalence, symptom profile, and predictors of school absenteeism related to dysmenorrhea among high school students in Saudi Arabia.

Methods: A cross-sectional study was performed among female high school students (n = 1,066), using a non-probability convenience sampling method via a validated electronic questionnaire. Data were analyzed using SPSS (version 26.0; IBM Corp., Armonk, NY, USA) utilizing descriptive statistics, Chi-square tests, Cramer's V, and binary logistic regression.

Results: Dysmenorrhea prevalence was 87.5% (n = 933), with 54.4% reporting moderate pain and 31.5% severe pain. The most frequent extra-pelvic symptoms were headache (57.6%), nausea (52.3%), and diarrhea (27.7%). Pain intensity correlated strongly with functional impairment ($p < 0.001$), with 95.5% of severe cases reporting disrupted daily activities. Overall school absenteeism was 57.5%, rising to 86.0% among students with severe pain. Logistic regression identified severe pain as the factor most strongly associated with absenteeism (OR: 25.99, 95% CI: 15.42–43.80, $p < 0.001$), followed by psychological stress (OR: 2.65, $p < 0.001$) and Saudi nationality (OR: 1.78, $p = 0.003$). Despite high severity, 70.1% had never consulted a physician.

Conclusion: Dysmenorrhea is highly prevalent among Saudi female adolescents and is strongly associated with school absenteeism. School-based menstrual health literacy initiatives and accessible management protocols are urgently needed.

Keywords: Dysmenorrhea, Saudi Arabia, School Absenteeism, adolescent health, menstrual pain, prevalence.

Background

Dysmenorrhea, or painful menstruation, is defined as painful cramps that begin a few hours before the onset of bleeding and may persist for hours or days [1]. Dysmenorrhea can either be primary or secondary. In primary dysmenorrhea, the painful menstruation occurs without pelvic pathology, while in secondary dysmenorrhea is associated with underlying pelvic pathologies such as endometriosis, uterine myomas, and pelvic inflammatory disease [2,3]. Primary dysmenorrhea is the most common type, and it ordinarily affects adolescent women and young adults, while secondary dysmenorrhea is more common among older women [2,3]. Dysmenorrhea is characterized by lower abdominal or pelvic pain, but it is often accompanied by other biological symptoms, including dizziness, fatigue, sweating, backache, headache, nausea, vomiting, and

Correspondence to: Dalia Alqarni
*College of Medicine, University of Bisha, Saudi Arabia
Email: Daliaqarnii@gmail.com
Full list of author information is available at the end of the article.
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diarrhea, all occurring just before or during menstruation [4].

Although the cause of dysmenorrhea is not well established, it is believed to be linked to increased production of uterine prostaglandins, which leads to increased uterine tone and high-amplitude contractions [5]. Some of the identified risk factors of dysmenorrhea include age < 20, smoking, depression/anxiety, and nulliparity [6]. In a study by Tadese et al., it was established that students who skipped breakfast were 37% less likely to experience dysmenorrhea, while students whose fathers were unable to read and write were two times more likely to experience dysmenorrhea [7]. Further, chocolate consumption and family history were also identified as risk factors for the condition [7].

Dysmenorrhea significantly affects patients' quality of life, and it is a major cause of frequent short-term work and school absenteeism among women of reproductive age [8,9]. Further, dysmenorrhea has been linked to lower academic performance and poor quality of sleep, resulting in mood changes, such as anxiety and depression [10]. Given how impactful dysmenorrhea can be to a patient's life, it is important to control risk factors as much as possible and enhance early diagnosis for effective treatment [11,12]. However, despite the risks that dysmenorrhea poses to patients' quality of life, many women fail to report pain and/or seek medical treatment, leading to underdiagnosis and undertreatment of the condition [12]. A study involving German and Austrian women found that out of 3230 women reporting symptoms consistent with dysmenorrhea, only 4.6% (n = 149) reported being diagnosed with the condition [13].

Therefore, establishing the actual prevalence of the condition in a specific population is critical in understanding the dynamics of the disease and appropriate interventions. This study seeks to investigate the prevalence and impact of dysmenorrhea among high school students in Saudi Arabia.

Materials And Methods

Study design and setting

A descriptive, cross-sectional study was conducted to assess the prevalence, impact, and management of dysmenorrhea among high school girls in the Kingdom of Saudi Arabia. The study was carried out in public and private high schools across multiple regions of Saudi Arabia to ensure broad geographic and sociodemographic representation. Schools were included to capture students from different educational settings; however, no stratification by region or school type was applied.

Study population and sampling

The study population consisted of female students enrolled in grades 10–12 in Saudi high schools during the study period. Both Saudi and non-Saudi students were eligible to participate. A non-probability convenience sampling approach using an electronic survey distribution method was employed. The questionnaire link was disseminated broadly through commonly used electronic and social media platforms, targeting high school students across the Kingdom. Eligible students who met the inclusion criteria and voluntarily agreed to participate were included until the required sample size was achieved. No stratification based on age, school type, or region was applied.

Inclusion criteria included female high school students aged approximately 15–19 years who were currently enrolled in grades 10–12 and willing to participate in the study. Written informed consent was obtained from all participants, and for students under 18 years, written consent was obtained from their parents or legal guardians. Students who declined participation, whose parents or legal guardians did not provide consent, or who did not complete the questionnaire were excluded from the study.

Sample size calculation

The sample size was calculated based on data from the General Authority for Statistics [14], which reported that approximately 710,000 female students were enrolled in secondary schools in Saudi Arabia. Using the Raosoft online sample size calculator [15], the calculation was performed assuming a 95% confidence level, a margin of error of 5%, and a population proportion of 50% to yield the maximum sample size. The minimum required sample size was calculated to be 384 participants. To improve the precision of prevalence estimates, enhance statistical power, and compensate for potential non-response or incomplete questionnaires, the sample size was increased beyond the minimum requirement. Accordingly, a total of 1,066 participants were included in the final analysis.

Data collection tool and technique

Data were collected using a validated, self-administered electronic questionnaire consisting of 16 items. The questionnaire covered sociodemographic characteristics, menstrual history, severity of dysmenorrhea, associated physical and psychological symptoms, impact on daily activities and school attendance, and coping mechanisms used for pain management. The questionnaire was adapted from a previously published and validated study conducted among adolescent schoolgirls [16]. Minor modifications were made to enhance suitability for the Saudi context, including the addition of questions related to nationality. The modified questionnaire was reviewed and approved by the Research Committee of the College of Medicine to ensure scientific validity and cultural appropriateness. The questionnaire was created using Google Forms and distributed electronically through commonly used social media platforms. Before accessing the questionnaire, participants were presented with an electronic informed consent form. Those who agreed to participate completed the questionnaire independently. Participation was voluntary, responses were anonymous, and no personally identifiable information was collected.

Statistical analysis

Data were entered into Microsoft Excel and analyzed using the Statistical Package for the Social Sciences

(SPSS) version 26.0; IBM Corp., Armonk, NY, USA [17]. Descriptive statistics were used to summarize the data, including frequencies, percentages, and standard deviations where appropriate. The prevalence of dysmenorrhea was calculated and reported with 95% confidence intervals. Associations between dysmenorrhea severity and categorical variables were assessed using the Chi-square test. Differences in age at menarche across pain severity groups were examined using Chi-square tests of independence, while the associations between pain severity, psychological stress, and daily activity impairment were evaluated using Chi-square tests and Cramer's V for effect size. A binary logistic regression analysis was performed to identify factors associated with school absenteeism. Results were reported as odds ratios with 95% confidence intervals. A p-value of < 0.05 was considered statistically significant.

Ethical considerations

Ethical approval for this study was obtained from the Research Ethics Committee of the University of Bisha (Ref No.: UB-RELOC H-06-BH-087/ (14/08/47), approved on March 3, 2026). The study was conducted in accordance with the principles of the Declaration of Helsinki. Participation was entirely voluntary, and electronic informed consent was obtained from all participants before completion of the questionnaire. Confidentiality and anonymity were strictly maintained throughout the study. No personal identifiers were collected, and access to the data was restricted to the research team only.

Results

The findings of this cross-sectional study are based on an analytical sample of 1,066 female high school students. The most represented age group was 16–18 years, comprising 57.7% of the categorized sample (n = 615). The sociodemographic characteristics of the study participants are summarized in Table 1.

Analysis of the menstrual history of the study participants showed that most individuals experienced the onset of menarche within the normal age range of 12–13 years, accounting for 53.5% of the sample. This was followed by early onset of menarche, reported by 26.0% of participants, and late onset, reported by 20.5% of the participants. For the duration of the menstrual period, more than half of the students, 52.0% (n = 554), reported that their menstrual periods lasted for more than 5 days. In comparison, 35.9% of participants (n = 383) reported a duration of exactly 5 days. A minority of the cohort, representing 2.6% of participants, reported having short menstrual cycles lasting 3 days. The experience of dysmenorrhea within this cohort was nearly universal, with 87.5% of participants (n = 933) confirming that they experience pain during their menstrual periods. In contrast, only 12.5% of the participants (n = 133) reported that they do not experience any pain during menstruation. The menstrual history and prevalence of dysmenorrhea among the participants are summarized in Table 2.

The prevalence of dysmenorrhea was high, with 87.5% (n = 933) of participants confirming the experience of pain during their menstrual period. Among those reporting pain, the severity was categorized as moderate in the majority of cases (54.4%). Severe pain was reported by 31.5% (n = 336) of the participants, while mild pain was the least frequent category at 14.1% (n = 150).

The study utilized a multi-response set to identify the physical and psychological symptoms associated with the menstrual cycle. Lower back pain was identified as the most common physical symptom, reported by 72.9% (n = 765) of the cohort. Analysis of the multi-response data showed that headache was the most prevalent extra-pelvic symptom, reported by 57.6% (n = 614) of participants. This was followed by nausea at 52.3% (n = 558). Diarrhea was reported by 27.7% (n = 295). Psychologically, 84.0% (n = 895) of the total sample reported experiencing stress during their period, and 70.5% (n = 751) indicated that this stress made daily activities difficult to perform. The frequency of the associated physical and psychological symptoms is summarized in Table 3.

Table 1. *Sociodemographic profile of the study population (N = 1066).*

Variable	Category	Frequency (n)	Percentage (%)
Nationality	Saudi	893	83.8
	Non-Saudi	173	16.2
Age group	15–16 years	203	19.0
	16–18 years	615	57.7
	>18 years	248	23.3

Table 2. *Menstrual history and pain prevalence.*

Variable	Category	Frequency (n)	Percentage (%)
Pain experience	Yes	933	87.5
	No	133	12.5
Pain severity	Mild	150	14.1
	Moderate	580	54.4
	Severe	336	31.5
Period duration	3 days	28	2.6
	4 days	101	9.5
	5 days	383	35.9
	>5 days	554	52.0

Table 3. *Frequency of associated menstrual symptoms (multi-response set).*

Associated symptom	Frequency (n)	Percentage of cases (%)
Lower back pain	765	72.9
Headache	614	57.6
Nausea	558	52.3
Nervous tension	483	46.0
Diarrhea	295	27.7
Weight gain	255	24.3
Leg pain	131	12.5

Bivariate analysis was employed to examine the association between demographic variables and pain severity. A Chi-square test of independence revealed a significant association between participant age and the severity of menstrual pain ($\chi 2 = 49.42$, df = 30, $p = 0.014$), with older students more likely to report severe pain levels. In contrast, the association between nationality (Saudi vs. Non-Saudi) and pain severity was not statistically significant ($\chi 2 = 4.519$, df = 2, $p = 0.104$). Among Saudi nationals, 31.6% reported severe pain, compared to 31.2% among non-Saudi participants. The association between demographic characteristics and pain severity is presented in Table 4.

The functional impact of dysmenorrhea was analyzed by stratifying activity disruption and absenteeism by severity level. Results indicated a strong association between pain severity and functional impairment ($\chi 2 = 289.49$, $p < 0.001$). While only 20.0% of those with mild pain reported an impact on daily activities, this figure rose to 70.5% for moderate pain and 95.5% for severe pain. Similarly, school absenteeism was reported by 18.7% of students with mild pain, increasing to 51.0% for moderate pain and 86.0% for severe pain ($\chi 2 = 214.26$, $p < 0.001$). Medical consultation was also more frequent among those with higher pain levels, with 50.0% of the severe group seeking help compared to 13.3% of the mild group. The functional and academic impact of dysmenorrhea according to pain severity is summarized in Table 5.

Spearman's Rho correlation analysis was performed to evaluate the interrelationships between study variables. A significant moderate positive correlation was found between pain severity and daily activity impact ($r = 0.491$, $p < 0.01$). Pain severity also showed a weak but significant positive correlation with psychological stress ($r = 0.120$, $p < 0.01$). Furthermore, psychological stress was positively correlated with the difficulty in performing daily activities ($r = 0.259$, $p < 0.01$). The correlations among the primary study variables are presented in Table 6.

A binary logistic regression model was constructed to identify the independent predictors of school absenteeism. The model was statistically significant ($\chi^2 = 274.59$, $p < 0.001$), explaining 30.2% (Nagelkerke R^2) of the variance in absenteeism. Saudi nationality significantly increased the odds of absenteeism (OR = 1.776, 95% CI: 1.217−2.642, $p = 0.003$). However, pain severity was the most substantial predictor. Compared to those with mild pain, students with moderate pain were 4.38 times more likely to miss school (OR = 4.38, 95% CI: 2.80–6.86, $p < 0.001$). Those with severe pain were 25.99 times more likely to miss school (OR = 25.99, 95% CI: 15.42–43.80, $p < 0.001$). Psychological stress also independently predicted absenteeism (OR = 2.647, $p < 0.001$). The results of the binary logistic regression analysis are presented in Table 7. The detailed screening and selection process is illustrated in Figure 1.

Discussion

The present study demonstrates that dysmenorrhea is highly prevalent among high school students in Saudi Arabia, affecting a substantial majority of participants, with an overall prevalence of 87.5%. Most affected students reported moderate to severe pain, implying that the condition is not only widespread but that it is also clinically significant. More importantly, our results show a clear link between the severity of pain and the severity of functional outcomes, as more than 70% of the students reported disruption of daily activities and more than half reported missing school. This indicates dysmenorrhea to be a significant factor for the quality of life as well as academic participation of adolescents.

The findings show that dysmenorrhea imposes a significant functional burden beyond its high prevalence, particularly with increasing pain severity, as many students report moderate to severe symptoms and disruption of daily activities and school attendance. This suggests that it is not the presence of pain itself but rather its severity that determines real-life consequences among adolescents. Increasing pain intensity is clearly related to an increase in impairment in routine functioning and academic participation, adding to the clinical and educational importance of the condition. These findings

Table 4. *Association between demographics and reported pain severity.*

Demographic factor	Mild (*n = 150*)	Moderate (*n = 580*)	Severe (*n = 336*)	*p*-value
Nationality				
Saudi	117	494	282	0.104
Non-Saudi	33	86	54	
Age group				
13–15 years	3	13	9	**0.014**
16–18 years	147	560	320	
>18 years	0	7	7	

Abbreviations: X2 = chi-square; *p* = probability value.

Table 5. *Functional and academic impact stratified by pain severity.*

Severity level	Daily activity impact (*Yes*)	School absenteeism (*Yes*)	Medical consultation (*Yes*)
Mild	20.0%	18.7%	13.3%
Moderate	70.5%	51.0%	22.6%
Severe	95.5%	86.0%	50.0%
Total sample	71.3%	57.5%	29.9%
p-value	**<0.001**	**<0.001**	**<0.001**

Abbreviations: *p* = probability value.

Table 6. *Spearman Rho correlation matrix of primary study variables.*

Variable	*1. Pain severity*	*2. Daily impact*	*3. Psych stress*
1. Pain severity	1.000	0.491	0.120
2. Daily impact	0.491	1.000	0.259
3. Psych stress	0.120	0.259	1.000
Note: Correlation is significant at the 0.01 level (2-tailed).			

Abbreviations: Spearman's rho (ρ), Spearman rank correlation coefficient.

Table 7. *Logistic regression model for predictors of school absenteeism.*

Variable	B	S.E.	Wald	*P*-value	Exp(B) (OR)	95% CI (OR)
Saudi nationality	0.574	0.198	8.727	**0.003**	1.776	1.21–2.64
Moderate pain	1.477	0.229	43.298	**<0.001**	4.38	2.80–6.86
Severe pain	3.258	0.274	150.586	**<0.001**	**25.99**	15.42–43.80
Psych stress	0.973	0.196	24.649	**<0.001**	2.647	1.80–3.89
Constant	−2.738	0.930	3.788	0.065	0.164	—

Abbreviations: B = regression coefficient; S.E. = standard error; OR = odds ratio; CI = confidence interval.

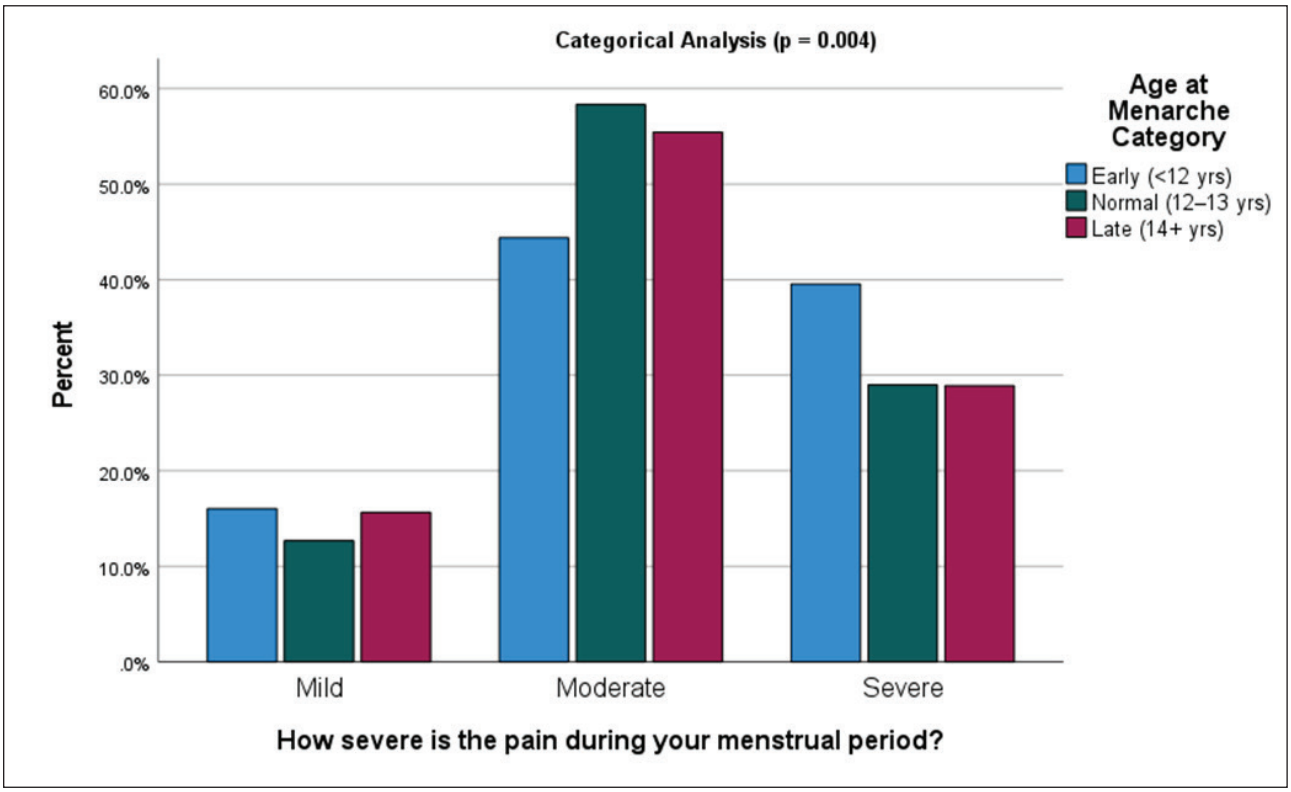


Figure 1. *Distribution of Menarche Age categories across pain severity.*

The categorical chi-square test revealed a statistically significant association between age at menarche and subsequent pain severity ($\chi^2(4) = 15.416$, $p = 0.004$). The crosstabulation findings showed that students who experienced early menarche (before 12 years) were more likely to report severe pain (32.4%) compared to those in the moderate pain group (21.3%). In contrast, adolescents with normal menarche onset (12–13 years) constituted the largest proportion of the moderate pain group (57.7%). These results indicate that early menarche was significantly associated with greater dysmenorrhea severity among Saudi female adolescents.

To maintain a uniform categorical analysis, participants were grouped by their age at menarche into three clinical categories: Early onset (<12 years), Normal onset (12–13 years), and Late onset (14+ years). A Pearson Chi-square test of independence was conducted to examine the association between menarche timing and the severity of menstrual pain.

are consistent with those described by Jareebi et al. [18], who also reported a similar high prevalence in Saudi females; however, the present analysis further highlights the importance of pain intensity in predicting functional outcomes. Differences in the distribution of severity across studies may be attributed to differences in age groups, assessment tools, and sociocultural perceptions of pain, but the generally high prevalence highlights the need for specific and context-specific interventions.

In addition to pain, this study showed a high frequency of associated physical and psychological symptoms. Lower back pain was reported by about 73% of the participants, followed by headache and nausea in more than half of the sample. Psychological stress was also highly prevalent, with about 84% of students having psychological stress, which was correlated positively with both pain severity and difficulty in daily functioning. These findings are consistent with the concept of dysmenorrhea as a multidimensional condition. While Alsaleem [4] found similar patterns of symptoms, this study further illustrates how these symptoms are grouped and aggregate to functional impairment. Variation between studies could be due to differences in awareness of symptoms, tools used to report symptoms, or cultural openness when discussing menstrual health.

One of the most significant results from the current research is the very strong link between the severity of pain and absenteeism from school. Overall, 57.5% of

students reported missing school because of menstrual pain, with absenteeism increasing dramatically in students with severe symptoms. Regression analysis confirmed that severe pain was the most significant predictor of absenteeism, with significantly higher odds than mild pain; psychological stress was an important factor. These results show that dysmenorrhea is not only a health problem but an important educational concern. Similar associations have been found in other settings, including Ethiopia, where dysmenorrhea had a substantial impact on academic performance [19]. However, the higher absenteeism seen in our study may be due to variation in coping strategies, school health support, or cultural attitudes to menstruation.

The data showed an association between age at menarche and pain levels ($p = 0.004$), with early menarche (<12 years) linked to higher likelihood of severe pain compared to normal or late onset. This is very important for early education and preparedness. Rathoria et al. [20] emphasized the need for adequate knowledge of menarche; inadequate knowledge can lead to poor menstrual hygiene and pain management practices. The lack of association in our findings may mean that other factors have a greater influence on how pain is perceived and its severity, such as psychological stress or lifestyle habits. Supporting this, Bajalan et al. [21] emphasized the significance of dietary and lifestyle factors, which were not directly evaluated in our study but may help to explain the high burden found.

Another interesting finding is the low proportion of healthcare-seeking behaviour despite the high burden of symptoms. Only a minority of students said they had consulted a physician, even those with severe pain. This gap indicates that many adolescents may normalize menstrual pain or use self-managing methods that may not be effective. Almanasef and Alqarni [22] reported that many young women prefer to have self-care and alternative remedies, which is in line with our observations. However, considering that almost one-third of the participants had severe pain, the low consultation rate indicates a need for better health education and adolescent-friendly service delivery.

The significant relationship between pain severity and functional limitation in this study also underlines the importance of the use of non-pharmacological management strategies. Evidence from Cai et al. [23] suggests that regular physical activity can be effectively used to reduce the intensity of dysmenorrhea. Given that a significant proportion of students in this study experienced activity limitations, the integration of structured exercise and health education programmes into the school settings may be beneficial. Such interventions may help to reduce both the physical and psychological effects of dysmenorrhea.

Several limitations to this study should be considered. The cross-sectional design reduces the capacity to arrive at causal inferences between variables such as pain severity, stress, and absenteeism. The use of self-reported information opens up the likelihood of recall bias and subjective symptom interpretation. Further, electronic distribution of the questionnaire may have excluded some students, which would cause selection bias. The study also did not discuss detailed clinical, dietary, or lifestyle factors that might further explain why dysmenorrhea severity varies. Despite these limitations, the large sample size and consideration of important functional outcomes have strengthened the validity of the results and given them a meaningful insight into the burden of dysmenorrhea among Saudi Arabian adolescents.

Conclusion

A high prevalence of dysmenorrhea among female high school students in Saudi Arabia was found in this study, with most experiencing moderate to severe pain. Higher pain severity was strongly associated with functional impairment, psychological stress, and school absenteeism, suggesting this was a health- and educational-linked challenge. Despite this significant burden, healthcare-seeking behavior remained low even among students with severe symptoms. The results support the importance of early identification, school-based menstrual health education, and accessible management strategies for minimizing the physical, psychological, and academic consequences of dysmenorrhea in adolescents.

List of abbreviations

CI	confidence interval
OR	odds ratio

Conflicts of interest

The authors declare that they have no conflict of interest regarding the publication of this article.

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Informed Consent

Written informed consent was obtained from all participants. For students under 18 years, written consent was obtained from their parents or legal guardians.

Ethical Approval

Ethical approval for this study was obtained from the Research Ethics Committee of the University of Bisha (Ref No.: UB-RELOC H-06-BH-087/ (14/08/47), approved on March 3, 2026).

Author details

Mashael Obaid F Alsaadi[1], Abdullah M. Alshahrani[2], Munirah Ayidh Aldhalaliah[1], Maria Abdulaziz Alrafi[3], Dalia Alqarni[1], Aisha Ibrahim N. Alzoghaibi[3], Alhanouf Shaya Aldayili[3], Basma Mohammad Alghamdi[3], Dania Ahmed A Farhan[4], Leen Mohamed Sayed[3], Zainab Mohamed Rizaan[3]

1. College of Medicine, University of Bisha, Saudi Arabia.
2. Department of Family and Community Medicine, College of Medicine, University of Bisha, Bisha, Saudi Arabia.
3. College of Medicine, AlMaarefa University, Riyadh, Saudi Arabia.
4. College of Medicine, King Abdulaziz University, Jeddah, Saudi Arabia.

Supplementary content (If any) is available online.

References

1. Dharmapuri S. Dysmenorrhea in adolescents. Pediatr Med. 2019;2:34–4. https://doi.org/10.21037/pm.2019.06.09

2. Itani R, Soubra L, Karout S, Rahme D, Karout L, Khojah HMJ. Primary dysmenorrhea: pathophysiology, diagnosis, and treatment updates. Korean J Fam Med. 2022;43(2):101–8. https://doi.org/10.4082/kjfm.21.0103

3. Poli-Neto OB, Reid-McCann R. Dysmenorrhea: a public health challenge demanding urgent attention. Women Health. 2025;65(3):219–23. https://doi.org/10.1080/03630242.2025.2469938

4. Alsaleem M. Dysmenorrhea, associated symptoms, and management among students at King Khalid University, Saudi Arabia: an exploratory study. J Fam Med Prim Care. 2018;7(4):769. https://doi.org/10.4103/jfmpc.jfmpc_113_18

5. Bernardi M, Lazzeri L, Perelli F, Reis FM, Petraglia F. Dysmenorrhea and related disorders. F1000Research. 2017;6(6):1645. https://doi.org/10.12688/f1000research.11682.1

6. Al-Kindi R, Al-Bulushi A. Prevalence and impact of dysmenorrhoea among Omani High School Students. Sultan Qaboos Univ Med J. 2011;11(4):485–91. https://doi.org/10.18295/2075-0528.1318

7. Tadese M, Kassa A, Muluneh AA, Altaye G. Prevalence of dysmenorrhoea, associated risk factors and its relationship with academic performance among graduating female university students in Ethiopia: a cross-sectional study. BMJ Open. 2021;11(3):e043814. https://doi.org/10.1136/bmjopen-2020-043814

8. Gebeyehu MB, Mekuria AB, Tefera YG, Andarge DA, Debay YB, Bejiga GS, et al. Prevalence, impact, and management practice of dysmenorrhea among University of Gondar Students, Northwestern Ethiopia: a cross-sectional study. Int J Reprod Med. 2017;2017:1–8. https://doi.org/10.1155/2017/3208276

9. Mammo M, Alemayehu M, Ambaw G. Prevalence of primary dysmenorrhea, its intensity and associated factors among female students at High Schools of Wolaita Zone, Southern Ethiopia: cross-sectional study design. Int J Women's Health. 2022; 14:1569–77.

10. Mahwish N, Dube R, Sekhar Kar S, Santhosh M, Kidwai A, Kenneth JM. Prevalence and impact of dysmenorrhea on the academic performance of students at Medical and Health Sciences University. Emir Med J. 2024;05. https://doi.org/10.2174/0102506882288695240221071629

11. Özcan H, Albana J, Yarde F, Dekker JJML, Roos EJ, Goverde AJ, et al. Definition and criteria for diagnosing primary dysmenorrhea: a modified Delphi procedure. J Pediatr Adolesc Gynecol. 2025. https://doi.org/10.1016/j.jpag.2025.11.007

12. El-Hadad S, Lässer D, Sachs MK, Schwartz ASK, Haeberlin F, von Orelli S, et al. Dysmenorrhea in adolescents requires careful investigation of endometriosis: an analysis of early menstrual experiences in a large case-control study. Front Reproduct Health. 2023;5:1121515. https://doi.org/10.3389/frph.2023.1121515

13. Tavares de Arruda G, Barbosa-Silva J, Driusso P, Pathmanathan C, Armijo-Olivo S, Avila MA. Worldwide prevalence of dysmenorrhea: a systematic review and meta-analysis across 70 countries. Pain. 2025. https://doi.org/10.1097/j.pain.0000000000003768

14. General Authority for Statistics. Education Statistics. Riyadh: General Authority for Statistics; 2024. Available from: https://www.stats.gov.sa

15. Raosoft Inc. Sample Size Calculator. Seattle, WA: Raosoft, Inc.; 2004. Available from: https://raosoftcalculator.net

16. Lghoul S, Loukid M, Hilali MK. Prevalence and predictors of dysmenorrhea among a population of adolescent schoolgirls (Morocco). Saudi J Biol Sci. 2020;27(7):1737–42. https://doi.org/10.1016/j.sjbs.2020.05.022

17. IBM Corp. IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY: IBM Corp.

18. Jareebi MA, Almraysi SA, Otayf DAH, Alneel GA, Zughaibi AH, Mobarki SJ, et al. Dysmenorrhea among women living in Saudi Arabia: prevalence, determinants, and impact. Life (Basel, Switzerland). 2025;15(1):108. https://doi.org/10.3390/life15010108

19. Hailemeskel S, Demissie A, Assefa N. Primary dysmenorrhea magnitude, associated risk factors, and its effect on academic performance: evidence from female university students in Ethiopia. Int J Women's Health. 2016;8:489–6. https://doi.org/10.2147/IJWH.S112768

20. Rathoria R, Rathoria E, Singh V, Agrawal P, Bansal U. Knowledge, attitude, and practices regarding menstrual hygiene among adolescent school girls. Sudan J Paediatr. 2024;24(2):103–113. https://doi.org/10.24911/SJP.106-1683123185

21. Bajalan Z, Alimoradi Z, Moafi F. Nutrition as a potential factor of primary dysmenorrhea: a systematic review of observational studies. Gynecol Obstet Investig. 2019;84(3):209–24. https://doi.org/10.1159/000495408

22. Almanasef M, Alqarni H. Self-care strategies for the management of primary dysmenorrhea among young women in Asir region, Saudi Arabia: a cross-sectional study. Eur Rev Med Pharmacol Sci. 2023;27(1):172–8. https://doi.org/10.26355/eurrev_202301_30869

23. Cai J, Liu M, Jing Y, Yin Z, Kong N, Guo C. Aerobic exercise to alleviate primary dysmenorrhea in adolescents and young women: a systematic review and meta-analysis of randomized controlled trials. Acta Obstet et Gynecol Scand. 2025;104(5):815–28. https://doi.org/10.1111/aogs.15042