



Relationship Between General Health and Dysmenorrhea in Students at Shahrekord University in 2018

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Abstract

Background and aims: Dysmenorrhea is one of the most common problems that women experience. Dysmenorrhea brings about psychological problems for women and adversely affects their performance. Therefore, providing, maintaining, and promoting the health of women is an important goal. The present study was conducted to determine the relationship between general health and Dysmenorrhea in students of Shahrekord University in 2018.

Methods: In the present cross-sectional study, 245 female students were selected by random cluster sampling method from Shahrekord University in 2018. Data were collected using the GHQ28, visual analogue scale (VAS), and a reliable and valid questionnaire designed by the researchers to determine menstrual pattern. Data were analyzed using descriptive statistics, chi-square test, and independent samples *t* test.

Results: The mean age at menarche was 13.5 years. Dysmenorrhea was observed in 82.8% of students. The severity of pain was measured by the VAS scale, indicating that 22.3% of the participants had severe menstrual pain. The prevalence of dysmenorrhea in participants with a family history of Dysmenorrhea was greater and statistically significant. The result of the *t*-test showed that there is a relationship between dysmenorrhea and the general health of the participants ($P=0.036$). There was also a significant relationship between menstrual cycle regularity and physical characteristics of the participants ($P=0.019$). Significant relationships were also found regarding the interval between menstrual cycles and physical symptoms ($P=0.026$), and depression and general health ($P=0.0001$).

Conclusion: Due to the importance of dysmenorrhea and its high prevalence among female students, it is important to provide education and control on this disorder to improve the quality of life of women. It is also beneficial to create counseling centers to raise awareness of the psychological health of female students suffering from dysmenorrhea.

Keywords: General health, Dysmenorrhea, Student

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Introduction

The history of pain is as old as the history of human. It is considered a health issue and therefore, pain must be alleviated for moral reasons and for the physiological and psychological benefits of the person.^{1,2} Dysmenorrhea is one of the most common gynecological disorders, affecting about 50% of women and disrupting the daily activity of 10% of women.¹⁻⁷ The global prevalence of dysmenorrhea varies from 15.8% to 89.5%, with the highest prevalence among adolescents, ranging from 10 to 20%.³ The prevalence of primary dysmenorrhea in Iran in 2004 was determined to be between 74% and 85.5% in young girls.⁷ Clinically, dysmenorrhea is categorized as primary and secondary. Primary dysmenorrhea is the pain that occurs in the absence of pelvic inflammatory diseases

and an increase in the synthesis of prostaglandins that are secreted from the endometrium during the menses. Secondary dysmenorrhea is attributed to dysmenorrhea due to pelvic pathology.¹⁻¹⁶

In primary dysmenorrhea, the pain begins with the start of bleeding and lasts 12-72 hours. The pain is mostly felt in the lower abdomen in the form of muscle cramps and variable severity,^{1-3,10-14} and in certain cases, it is accompanied by nausea, vomiting, soreness, and headache. The pain is usually in sync with ovulation cycles and starts within six months to one year after the menarche and then can increase.¹⁻⁷ Primary dysmenorrhea impacts women economically and socially across the world and is considered a major reason for absenteeism in schools and workplace.^{1-8,15} Menstrual pain is subject to several factors

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including menstrual cycle characteristics, marital status and birth, lack of social support, nutrition, smoking, physique, daily activities, and family history. In addition, psychological factors such as emotions, anxiety, and stress affect dysmenorrhea.¹⁶

Research shows that dysmenorrhea is more common in girls with unstable emotional and psychological states and causes an unpleasant feeling.³ In a study conducted by Jalili et al, the prevalence of dysmenorrhea was reported to be 79.9% among the participants, who also reported similar conditions in their sisters and mothers. In addition, 74.8% of the participants believed that their pain had limited their daily activity.¹⁷ In a study on 19-year-old Swedish women, Andersch and Milsom reported a prevalence of 72% for menstrual pain, of whom 15% reported that their daily activities were impaired by the pain and that the pain would not decrease by pain killers.¹⁸ The high prevalence of dysmenorrhea, the side effects of medication, and also the consequential economic and social problems associated with dysmenorrhea warrant a solution.¹ Because the physical and psychological well-being of students affects their performance, universities should provide the necessary measures to address this problem.¹⁹ Given that dysmenorrhea is one of the factors affecting the quality of life and social activities of young women, in this study, we tried to investigate the relationship between general health and dysmenorrhea among female students at Shahrekord University.

Materials and Methods

The present study was cross-sectional in design, which was conducted in October 2018. The population of the study included female students enrolled at Shahrekord University. Cluster sampling method was used to select 245 students using the following sample size estimation equation with a confidence interval of 95%.

$$N = (Z_{1-\alpha/2})^2 S^2 / d^2 = 1/96^2 \cdot 4^2 / \left(\frac{1}{8} \times 4\right)^2$$

The investigation among students required ethical permission that had already been approved by the Ethics Committee of Shahrekord University of Medical Sciences. The clusters in the study included all the academic departments (agriculture, natural resources, geoscience, natural science, engineering, and literature) and were randomly selected. Next, female students were randomly selected from those clusters for the required sample size estimated above. A consent form was obtained from the students and they were informed about the research purpose and assured of the anonymity of their responses. The inclusion criteria included having Iranian nationality, having secondary dysmenorrhea, having an experience of a trauma or highly stressful event in the past 6 months, taking

medication for mental health, having mental problems in the past year, and having enrolled at Shahrekord University. Exclusion criteria included unwillingness to participate, incomplete questionnaires, and physical unfitness to respond to the questionnaires.

The data were collected using a questionnaire with three sections. The first section asked about demographic information (e.g., age, education, marital status, residence). The second section included items constructed by the researcher and determined menstrual pattern and characteristics, such as menstrual cycle (regular or irregular), cycle length (based on days), duration of menstrual bleeding (measured in days), suffering from dysmenorrhea, age at menarche, history of dysmenorrhea in family, and the severity of pain.

The validity of the instrument was verified using content validity reviewed and approved by subject matter experts. Flagged items were revised. The internal reliability of the instrument was 0.70 (Cronbach alpha). The severity of pain was measured using the visual analogue scale (VAS), which is a standard and reliable instrument.²⁰⁻²⁴ VAS measures pain on a 0-10 scale, where zero indicates no pain, 1-3 indicates mild pain, 4-7 indicates moderate pain, and 8-10 indicates extreme pain.²⁵ The third section of the questionnaire included items from the GHQ-28 general health questionnaire. GHQ was first developed by Goldberg in 1972 to diagnose physical symptoms (items 1 through 7), mental symptoms such as depression, stress, and sleep disorder (items 8 through 14), social functioning in different contexts (items 15 through 21), and depression (items 22 through 28).^{26,27} Items were scored on a four-point ordinal Likert scale (never, typically, often, more often). A sum score of 6 and higher in each section and a sum score of 22 and higher in total were considered symptomatic. The internal consistency of this questionnaire was reported to be 0.85 by Noorbala et al.²⁸ The reliability of the scale was further verified by Mirkamali et al²⁹ and Montazeri et al.³⁰

Data were analyzed using SPSS version 22.0. Data analyses included descriptive statistics, chi-square test, and *t* test at the significance level of 0.05.

Results

The mean age of participants in the study was 20.76±9.74 years. Of 245 participants, 84.9% were unmarried. Education levels included undergraduate (90.2%) and graduate (2%) level enrollment. In terms of residence, 87.3% lived in urban areas. The mean (and standard deviation) age at menarche was 13.5±1. The distribution of the severity of pain included 22.3% severe pain, 45.5% moderate pain, and 32.2% mild pain, indicating that most of the females (45.5%) had moderate pain (Figure 1).

Family history of dysmenorrhea was reported by 57.1% (140) of the participants. A significant relationship was found between a positive family history of dysmenorrhea

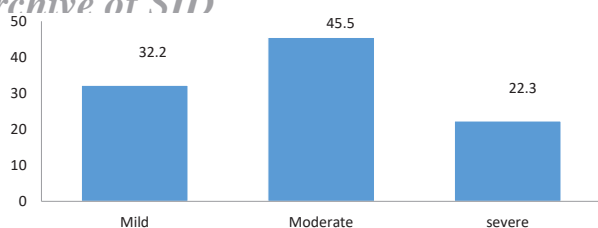


Figure 1. Distribution of Dysmenorrhea of Female Students at Shahrekord University in 2018.

and suffering from dysmenorrhea ($P < 0.000$). The majority of the students had regular menstruation (64.1%), with a menstrual cycle of 21 to 42 days (mean of 27.3 days) and duration of menstrual flow of 3-7 days (mean of 5.3 days) (Table 1). Based on the subscale scores, the general health of most students was at an acceptable level with a mean score of 26.85 ± 17.83 . Table 2 shows the mean and standard deviation of the different aspects of health. The mean score on social functioning (8.29 ± 3.3) was higher compared to other aspects, implying that participants had more problems in this area.

There was a significant relationship between menstrual regularity and physical characteristics of the participants ($P = 0.019$). Significant relationships were also found between menstrual cycle interval and physical symptoms ($P = 0.026$) and depression and general health ($P = 0.0001$) (Table 3). Furthermore, the result of the t test showed that there is a relationship between dysmenorrhea and the general health of the participants ($P = 0.036$).

Discussion

One cause for mental pressures in women is menstrual cycles. Dysmenorrhea can cause significant socio-economic and psychological problems.¹⁵ According to research, the prevalence of dysmenorrhea is on the rise in recent years due to environmental and genetic factors.⁸ The mean age at menarche in our study was 13.5 ± 1 years. In a study on Iranian girls' sports teams, the mean age at menarche was found to be 13.18 ± 0.06 years.³¹ Singh et al and Ortiz et al found similar findings in India and Mexico, respectively.^{20,32} The mean age at menarche differs in different geographical regions due to genetic, geographical, and nutritional factors. Scientists believe that the age at menarche has decreased.³³

The results of the present study show that 82.8% of female students have suffered dysmenorrhea. The results of

a study by Unsal et al showed a prevalence rate of 72.7% for dysmenorrhea³⁴ and Seven et al showed that 84.9% of the students had experienced dysmenorrhea.³⁵ Those results are similar to the ones in our study. However, in a study on the prevalence of dysmenorrhea in Canada among 2721 women aged 18 years and older conducted by Burnett et al,³⁶ a prevalence of 60% was reported, which is lower than our result. Therefore, we can conclude that the prevalence of dysmenorrhea is higher in our population than in other populations. Menstrual patterns may be different in different geographic regions.

The distribution of the severity of pain shows that 22.3% of respondents had severe pain, 45.5% of them faced moderate pain, and 32.2% experienced mild pain. A study conducted in Pakistan showed distributions of 8.05% severe pain, 32.21% moderate pain, and 59.7% mild pain in a sample of medical students.³⁷ The study on young girls by Haidari et al⁸ showed that 26.04% of the participants experienced severe pain, 45.61% had moderate pain, and 28.35% reported mild pain.

Although no significant relationship was found between marital status and the severity of pain, the results show that 57.2% of unmarried participants and 45.9% of married participants had experienced dysmenorrhea. Therefore, we can conclude that dysmenorrhea has a higher rate in

Table 1. Frequency Distribution of Students of Shahrekord University Based on Their Menstrual Cycle in 1396

Menstrual Characteristics		No.	%
Duration of menstrual bleeding (days)	Hypomenorrhea (<3 days)	4	1.7
	Normal (3-7 days)	212	86.5
	Hypermenorrhea (>7 days)	29	11.8
Menstrual cycle (days)	Polymenorrhea (<21 days)	35	14.3
	Normal (21-42 days)	201	82
	Oligomenorrhea (>42 days)	9	3.7
Menstrual cycle regularity	Regular	157	64.1
	Irregularity	88	35.9

Table 2. Mean Score and Standard Deviation of Different Aspects of General Health in Students

General Health Dimension	Mean \pm SD
Physical symptoms	7.76 \pm 10.7
Anxiety and sleep disorder	6.08 \pm 4.3
Social functioning	8.29 \pm 3.3
Depression	4.71 \pm 4.6

Table 3. Relationship between General Health Dimensions and Menstrual Variables

Menstrual Variables	General Health Dimensions			
	Symptoms of Social Functioning P Value	Symptoms of Depression P Value	Anxiety Symptoms and Sleep Disorders P Value	Physical Symptoms P Value
Menstrual irregularity	0.924	0.066	0.101	0.019*
Menstrual interval	0.144	0.000*	0.120	0.026*

single women. This result is in line with that of a study by Sharifan et al.¹

Regarding the menstrual irregularity, 64.1% of the students showed a regular menstrual pattern. In a study by Basirat and Haji Ahmadi,¹¹ 54.4% of high school students reported regular menstruation. The higher percentage of regular menstruation in our sample could be due to the higher age of the participants because in the first 2 years from the onset of menarche, irregular menstruation is more frequent because of an under-developed hypothalamus-hypophysis axis.⁴

In the present study, 13.5% of the subjects had abnormal menstrual bleeding (less than 3 and more than 7 days), while in a study by Kordi et al³³ on female students in Mashhad, the rate was 31.1%, which could be due to the younger age of the participants. In our study, the frequency of polymenorrhea was 14.3% and that of oligomenorrhea was 3.7%, which were similar to the results obtained by Noroozi et al,³⁸ which showed frequencies of 11.4% and 12.5% for polymenorrhea and oligomenorrhea, respectively.

A family history of dysmenorrhea was reported by 57.1%. The results showed a statistically significant relationship between a positive family history of dysmenorrhea and the occurrence of dysmenorrhea among students ($P=0.0001$). Unsal et al³⁴ also concluded that dysmenorrhea was more prevalent in women who had a positive family history of dysmenorrhea.

A highlight of our study is the investigation of the relationship between dysmenorrhea and general health dimensions. Although there has been a previous study on the relationship between dysmenorrhea and stress, our study is the first in Iran to investigate the relationship between dysmenorrhea and different dimensions of general health in women. The result shows a statistically significant relationship ($P=0.036$), indicating that women with poorer general health have a higher degree of dysmenorrhea. Westling et al³⁹ found that psychological factors affect the occurrence of primary dysmenorrhea.

In this study, we found a statistically significant relationship between anxiety and sleep disorder dimensions of general health and dysmenorrhea ($P=0.018$). A comparable study is that of Nazarpour, in which physical well-being significantly correlated with the severity of menstrual pain.⁵ In addition, different studies found that female students complained more about physical discomfort, compulsiveness, depression, anxiety during menstruation, and menstrual irregularity. Their results support our findings. However, in that study, only the mean score of physical symptoms was higher during menstruation, which differs from our findings.⁴⁰⁻⁴²

Although we did not find a significant relationship between depression and the regularity of menstruation, other previous study (Akdeniz and Karadağ⁴³) has shown that there is a significant relationship between psychological

complaints and the regularity of menstruation. This difference in menstrual patterns may be different in different geographic regions.

Nohara et al conducted a study in 2011 on the regularity of menstruation and dysmenorrhea problems in which they found that 17.1% of the participants had experienced an irregular menstrual cycle.⁴⁶ In addition, different researchers found a significant relationship between dysmenorrhea and stress.^{44,45} Stress was a significant factor in the relationship between irregular menstruation and dysmenorrhea.⁴⁶ In addition, a significant relationship was found between stressful situations and dysmenorrhea ($P<0.000$) in studies conducted by Akhavanakbari & Ahangar Davoudi⁴ and Abadi-Bavil et al.⁹

Conclusion

Given that the high prevalence of dysmenorrhea can disrupt everyday life activities, it is very important to provide education on how to control the severity of dysmenorrhea and improve the quality of life of women. In addition, because there is a relationship between dysmenorrhea and general health, we recommend health policymakers provide improved counseling centers to enhance the mental health of students suffering from dysmenorrhea.

Conflict of Interest Disclosures

None.

Ethical Approval

This research project was approved by the Ethics Committee of Shahrekord University of Medical Sciences (IR.SKUMS.REC.1396.14).

Authors' Contributions

ZK, LR, AS, and ML conceived and designed the study. Data analysis was performed by ML. Preparation of the first draft of the manuscript was done by ZK, LR, AS, and ML, and also all authors reviewed and revised the manuscript. In addition, all authors approve the final draft of the manuscript.

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References

1. Sharifan S, Esmailzadeh M, Yaghubifar M, Mohsenpour M,

- Rakhsani M. Check the pattern and severity of dysmenorrhea in students living in dormitories Sabzevar University of Medical Sciences. Journal of Student Research Committee, Sabzevar University of Medical Sciences. 2012;17(1-2):7-12. [Persian].
2. Zahedifard T, Firozi M. Assessment of the articles related to primary dysmenorrhea in dimension of menstrual pain assessment tools. Iran J Obstet Gynecol Infertil. 2016;19(4):17-27. doi: 10.22038/ijogi.2016.6900. [Persian].
 3. Nazarpour S, Khazai K. Correlation between body image and coping styles with severity of primary dysmenorrhea. Journal of Fundamentals of Mental Health. 2012;14(56):344-55. doi: 10.22038/jfmh.2013.893. [Persian].
 4. Akhavanakbari P, Ahangar Davoudi S. Dysmenorrhea frequency and severity and its related factors in students of Ardabil University of Medical Science in 1388. Journal of Health. 2010;1(3):41-7. [Persian].
 5. Nazarpour S. Study of factors of influencing on severity of primary dysmenorrhea in students of faculties of nursing and midwifery of governmental universities under the supervision of ministry of health, treatment and medical education in Tehran. Journal of Woman & Hygiene. 2010;1(2):109-25. [Persian].
 6. Ramezanpour MR, Kargoza M. The effect of Pilates training on the severity and duration of dysmenorrheal pain and duration of bleeding in young girls. Iran J Obstet Gynecol Infertil. 2018;21(6):1-8. doi: 10.22038/ijogi.2018.11627. [Persian].
 7. Gilasi H, Suki Z, Kohzadi SH, Khasi B. Investigate the prevalence of dysmenorrhea and some related factors in female students in Kashan University of Medical Sciences. Zanko Journal of Medical Sciences. 2015;16(50):27-34. [Persian].
 8. Haidari F, Akrami A, Sarhadi M, Mohammad Shahi M. Prevalence and severity of primary dysmenorrhea and its relation to anthropometric parameters. Hayat. 2011;17(1):70-7. [Persian].
 9. Abadi-Bavil D, Dolatian M, Mahmoodi Z, Akbarzadeh-Baghdan A. Comparison between stress and self-care in students with and without primary dysmenorrhea at Mazandaran University of Medical Sciences in 2015. Community Health. 2017;4(3):197-203. [Persian].
 10. Kazemian A, Parvin N, Delaram M, Deris F. Comparison of analgesic effect of *Valeriana officinalis* and mefenamic acid on primary dysmenorrhea. J Med Plants. 2017;16(64):153-9. [Persian].
 11. Basirat Z, Haji Ahmadi M. Evaluation of dysmenorrhea and premenstrual syndrome in high school girls in Babol. Iran J Obstet Gynecol Infertil. 2006;9(1):19-25. doi: 10.22038/ijogi.2006.5986. [Persian].
 12. Atashak S, Rashidi S. Effect of eight-week high-intensity interval training and ginger supplementation on primary dysmenorrhea in nonathletic female students. Iran J Obstet Gynecol Infertil. 2018;20(12):23-31. doi: 10.22038/ijogi.2017.10425. [Persian].
 13. Sajjadi M, Bahri N, Abavisani M. Aromatherapy massage with geranium essence for pain reduction of primary dysmenorrhea: a double blind clinical trial. Iran J Obstet Gynecol Infertil. 2018;20(12):50-7. doi: 10.22038/ijogi.2017.10430. [Persian].
 14. Masoumi SZ, Shayan A, Ahmadinia H, Ebrahimi R, Ahmadinia-Tabesh R, Moradkhani SH, et al. Effects of fenugreek seeds on the severity and duration of pain in primary dysmenorrhea in the students at Hamadan University of Medical Sciences, Iran (2016). Iran J Obstet Gynecol Infertil. 2018;21(4):25-33. [Persian].
 15. Aghamiri Z, Vige M, Latifnezhead R, Nabavi S. Study of effect of acupressure methods on pain in primary dysmenorrhea. Hayat. 2006;11(3-4):19-28. [Persian].
 16. Abedian Z, Khalajinia Z, Hassanabadi H, Esmaili H. The comparison of personality characteristics of medical university students with and without early dysmenorrhea. Journal of Sabzevar University of Medical Sciences. 2007;14(3):185-91. [Persian].
 17. Jalili Z, Safizadeh H, Shams Poor N. Prevalence of primary dysmenorrhea in college students in Sirjan, Kerman. Payesh. 2005;4(1):61-7. [Persian].
 18. Andersch B, Milsom I. An epidemiologic study of young women with dysmenorrhea. Am J Obstet Gynecol. 1982;144(6):655-60. doi: 10.1016/0002-9378(82)90433-1.
 19. Azizi Nejad B, Porheydar R, Soltani P. A study on the relationship between mental health and internal factors among public health students in Urmia University of Medical Sciences. The Journal of Urmia Nursing and Midwifery Faculty. 2015;12(12):1139-46. [Persian].
 20. Singh A, Kiran D, Singh H, Nel B, Singh P, Tiwari P. Prevalence and severity of dysmenorrhea: a problem related to menstruation, among first and second year female medical students. Indian J Physiol Pharmacol. 2008;52(4):389-97.
 21. Doty E, Attaran M. Managing primary dysmenorrhea. J Pediatr Adolesc Gynecol. 2006;19(5):341-4. doi: 10.1016/j.jpjg.2006.06.005.
 22. Modarres M, Mirmohammad A, Oshrieh Z, Mehran A. Comparison of the effect of mefenamic acid and matricaria camomilla capsules on primary dysmenorrhea. J Babol Univ Med Sci. 2011;13(3):50-8. [Persian].
 23. Amiri Farahani L, Heidari T, Narenji F, Asghari Jafarabadi M, Shirazi V. Relationship between pre menstrual syndrome with body mass index among university students. Hayat. 2012;17(4):85-95. [Persian].
 24. Kordi M, Firoozi M, Esmaili H. Effect of LI4 acupressure on labor pain in the first stage of labor in nulliparous women. Hayat. 2011;16(3):95-101. [Persian].
 25. Wewers ME, Lowe NK. A critical review of visual analogue scales in the measurement of clinical phenomena. Res Nurs Health. 1990;13(4):227-36. doi: 10.1002/nur.4770130405.
 26. Yaghubi H, Karimi M, Omid A, Barouti E, Abedi M. Validity and factor structure of the General Health Questionnaire (GHQ-12) in university students. International Journal of Behavioral Sciences. 2012;6(2):153-60. [Persian].
 27. Bayani A, Goudarzi, Kouchaki A. Relationship of dimensions of psychological well-being and general health among students of Islamic Azad University, Azadshahr branch. Knowledge & Research in Applied Psychology. 2008;10(35-36):153-64. [Persian].
 28. Noorbala AA, Bagheri Yazdi SA, Yasamy MT, Mohammad K. Mental health survey of the adult population in Iran. Br J Psychiatry. 2004;184:70-3. doi: 10.1192/bjp.184.1.70.
 29. Mirkamali SM, Khabare K, Mazari E, Farhadi Amjad F. The role of mental health on academic performance of university students; with the meditation of academic achievement motivation. Knowledge & Research in Applied Psychology. 2015;16(2):101-9. [Persian].
 30. Montazeri A, Harirchi AM, Shariati M, Garmaroudi G, Ebadi M, Fateh A. The 12-item General Health Questionnaire (GHQ-12): translation and validation study of the Iranian version. Health Qual Life Outcomes. 2003;1:66. doi: 10.1186/1477-7525-1-66.
 31. Kabir A, Torkan F, Hakemi L. Evaluation of menarche age and relevant factors in Iranian female participants of the 1381 student olympic games. Iran J Endocrinol Metab. 2006;8(4):383-91. [Persian].
 32. Ortiz MI, Rangel-Flores E, Carrillo-Alarcón LC, Veras-Godoy HA. Prevalence and impact of primary dysmenorrhea among

- Mexican high school students. *Int J Gynaecol Obstet.* 2009;107(3):240-3. doi: 10.1016/j.ijgo.2009.07.031.
33. Kordi M, Mohamadirizi S, Shakeri MT. Investigating the age of menarche, dysmenorrhea and menstrual characteristics in high school girl students in Mashhad city in year 2011. *Iran J Obstet Gynecol Infertil.* 2012;15(33):10-8. doi: 10.22038/ijogi.2013.261. [Persian].
 34. Unsal A, Ayranci U, Tozun M, Arslan G, Calik E. Prevalence of dysmenorrhea and its effect on quality of life among a group of female university students. *Ups J Med Sci.* 2010;115(2):138-45. doi: 10.3109/03009730903457218.
 35. Seven M, Güvenç G, Akyüz A, Eski F. Evaluating dysmenorrhea in a sample of Turkish nursing students. *Pain Manag Nurs.* 2014;15(3):664-71. doi: 10.1016/j.pmn.2013.07.006.
 36. Burnett MA, Antao V, Black A, Feldman K, Grenville A, Lea R, et al. Prevalence of primary dysmenorrhea in Canada. *J Obstet Gynaecol Can.* 2005;27(8):765-70. doi: 10.1016/s1701-2163(16)30728-9.
 37. Parveen N, Majeed R, Zehra N, Rajar U, Munir AA. Attitude and knowledge of medical students of Isra University about dysmenorrhoea and its treatment. *J Ayub Med Coll Abbottabad.* 2009;21(3):159-62.
 38. Noroozi A, Tahmasebi R. Pattern of menstruation, hirsutism and dysmenorrhea in students of Boushehr medical and Khalig-e-Fars universities (2002-2003). *Hormozgan Medical Journal.* 2004;7(4):203-9. [Persian].
 39. Westling AM, Tu FF, Griffith JW, Hellman KM. The association of dysmenorrhea with noncyclic pelvic pain accounting for psychological factors. *Am J Obstet Gynecol.* 2013;209(5):422.e1-422.e10. doi: 10.1016/j.ajog.2013.08.020.
 40. Shaeiri MR, Atrifard M, Shojaei P, Taghizad Varjouy M. Psychological state comparison of female students of high schools and female students of universities during menstrual times. *Daneshvar Medicine.* 2008;15(76):35-44. [Persian].
 41. Beal SJ, Dorn LD, Sucharew HJ, Sontag-Padilla L, Pabst S, Hillman J. Characterizing the longitudinal relations between depressive and menstrual symptoms in adolescent girls. *Psychosom Med.* 2014;76(7):547-54. doi: 10.1097/psy.0000000000000099.
 42. Liu H, Yang F, Li Z, Chen C, Fang Z, Wang L, et al. Passive smoking, Cyp1A1 gene polymorphism and dysmenorrhea. *Reprod Toxicol.* 2007;24(1):114-9. doi: 10.1016/j.reprotox.2007.04.069.
 43. Akdeniz F, Karadağ F. [Does menstrual cycle affect mood disorders?]. *Turk Psikiyatri Derg.* 2006;17(4):296-304.
 44. Ibrahim NK, AlGhamdi MS, Al-Shaibani AN, AlAmri FA, Alharbi HA, Al-Jadani AK, et al. Dysmenorrhea among female medical students in King Abdulaziz University: prevalence, predictors and outcome. *Pak J Med Sci.* 2015;31(6):1312-7. doi: 10.12669/pjms.316.8752.
 45. Jeon GE, Cha NH, Sok SR. Factors influencing the dysmenorrhea among Korean adolescents in middle school. *J Phys Ther Sci.* 2014;26(9):1337-43. doi: 10.1589/jpts.26.1337.
 46. Nohara M, Momoeda M, Kubota T, Nakabayashi M. Menstrual cycle and menstrual pain problems and related risk factors among Japanese female workers. *Ind Health.* 2011;49(2):228-34. doi: 10.2486/indhealth.ms1047.