

Primary Dysmenorrhea Associated with Psychological Distress in Medical Sciences Students in The North of Iran: A Cross-Sectional Study

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Abstract

Background: Primary dysmenorrhea is the usual medical status in medical students that are defined as pain during the menstrual period. This study was done to evaluate the psychological problems associated with dysmenorrhea.

Materials and Methods: Three hundred forty students aged 18 to 20 years participated in this cross-sectional study (194 with dysmenorrhea and 150 without dysmenorrhea). In this cross-sectional study, data were collected through the sociodemographic checklist, the verbal multidimensional scoring system (VMS), and the revised version of the Symptom Checklist-90 (SCL-90-R) questionnaire using the convenience sampling method. This questionnaire includes 9 Subscale and a GSI index. We considered psychological distress to be equivalent to the Global Severity Index (GSI), which is obtained by dividing 90 questions by 90. The significance level of the tests was considered 0.05.

Results: The GSI of the SCL-90 score in the 194 students with dysmenorrhea and 150 students without dysmenorrhea was 1.02 ± 0.42 and 0.34 ± 0.15 respectively ($P < 0.001$). In the group with dysmenorrhea, the severity of dysmenorrhea was significantly associated with a family history of dysmenorrhea and mother's education ($P = 0.012$ and $P = 0.037$, respectively). The strongest predictors of $GSI > 1$ were a family history of dysmenorrhea and mother's education [odds ratio (OR) = 2.33, 95% confidence interval (CI), 1.43-4.15 and OR = 0.45, 95% CI, 0.24-0.87, respectively].

Conclusion: According to the result, dysmenorrhea is associated with psychological distress. Psychological interventions and counseling in addition to drug treatment are suggested for treatment of primary dysmenorrhea. Therefore, it is necessary to formulate strategies and health policies to recover psychological issues of menstrual health.

Keywords: Anxiety, Depression, Primary Dysmenorrhea, Psychological Distress

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Introduction

Primary dysmenorrhea is one of the most usual medical statuses during their childbearing age that is defined as pain during the menstrual period (1). In different studies, its prevalence has been reported to be 50 to 70.8% (2, 3). It is estimated that 3-40% of women have experienced moderate to severe dysmenorrhea (4). A numerous variety of symptoms during menstruation have been noted, including cramps, lower abdominal pain, headache, backache and leg pains, nausea, vomiting, diarrhea (5, 6), as well as exhaustion, dizziness, depressed mood and

irritability (7).

Risk factors for menstrual pain include a family history of dysmenorrhea, high menstruation flow, earlier age at menarche, and length of menstrual periods (8). Pain and its subsequences oblige women to use pharmacological and non-pharmacological treatments such as yoga, aromatherapy, and herbs (9). Menstruation is a physiological appearance that has various biopsychosocial points. It has reflectance for women of all cultures and socioeconomic levels. In the late luteal phase, a majority of women experience at least some degree of incoordination of mind and body.

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Predictors of painful menstruation include eating habits, smoking, physical activity, or lifestyle (10). Stress, depressed mood, anxiety, and irritability may be caused by severe pain (11).

There is growing evidence of a psychological cause for primary dysmenorrhea. One study reported that person with severe menstrual pain not only report a various psychograph from people of their own age in conditions of their mental well-being but are also more discontented with their body figure (10). In addition, a study demonstrated that there is a relation between neuroticism and menstrual pain. Also, social support in person with menstrual pain was less than in person without menstrual pain (7). Primary dysmenorrhea is strongly related to depression and anxiety. Therefore, attention should be given to mental health screening in these people and psychological support may be necessary during their management (12). Studies are contradictory about the impact of dysmenorrhea on mood. Some studies reported that dysmenorrhea affects mood, and some reported that it is not related. Also, no study has been conducted in Iran that has measured the psychological problems of dysmenorrhea by SCL-90 questionnaire. Therefore, it's important to pay attention to the effect of dysmenorrhea on mood. This study was done to evaluate the psychological problems associated with dysmenorrhea.

Materials and Methods

Participants

In this cross-sectional study, three hundred forty four students of Babol University of Medical Sciences (194 with dysmenorrhea and 150 without dysmenorrhea) evaluated between 2017 and 2019 in the north of Iran. In this study, convenience sampling method was used. Inclusion criteria included students 18 to 20 years of age, mild to severe primary dysmenorrhea, no record of pelvic or abdominal operation, primary dysmenorrhea that has initiated after two years of menarche and consent to entering the research. The exclusion criteria included secondary dysmenorrhea, failure to record pain intensity, heavy coffee intake, smoking or other drugs (except drugs used for dysmenorrhea), having severe stress for 6 months before the study and people with psychiatric problems who were taking medication. Dysmenorrhea criteria included beginning of pain before or during the menses, menses pain lasting for 1-3 days during each menstrual cycle, low back pain and lower abdominal pain during menstruation (13).

The sample size was estimated using the G * Power Software, considering a significance level of 0.05 and power of 0.80, to gain an effect size of 0.18 between the variables: dysmenorrhea and psychological distress. It was estimated about 340 based on these criteria. We used the available samples during the sampling period and 416 people were invited to this study. The researcher gave a description about the aim of the study. Three hundred

sixty nine members completed demographic/menstrual characteristics checklist and two questionnaires. We excluded four members with secondary dysmenorrhea and 21 members who answered incompletely to the questionnaires. Therefore, we enrolled 344 subjects in the final analysis including 194 members with menstrual pain and 150 students without menstrual pain. Therefore, sampling was performed on 344 students.

Measurements

In our study, data were collected through the demographic and menstrual characteristics, verbal multidimensional scoring system (VMS) and SCL-90-R questionnaires.

Demographic and menstrual characteristics checklist

The demographic and menstrual characteristics included body mass index (BMI), age, menarche age, interval and duration of menses, residence, the education level of mother and father, satisfaction with family income, and family history of dysmenorrhea.

The verbal multidimensional scoring system

This questionnaire consists of four questions to grading dysmenorrhea. VMS used to evaluate the score of dysmenorrhea degree of pain, restriction, and activities on the four degrees: without pain menses (nil), menses with pain but unusual use of analgesic or restriction of tasks (grade I), menses with medium pain with effect on daily activity and use of analgesic with relief (grade II), and menses with intense pain with the serious restriction on daily activity, useless use of analgesic, and symptoms such as nausea, affection, vomiting, headache, and diarrhea (grade III) (14). We selected students without dysmenorrhea based on the VMS scale, and students with painless menses (nil) on this scale were included in the dysmenorrhea group. In an Iranian study, the reliability and validity of VMS were calculated 0.81 and 0.78, respectively (15).

Symptom Checklist-90 R (SCL-90-R)

The SCL-90-R is a questionnaire in the field of psychiatry. This checklist contains 90 questions, 9 Subscale and a Global Severity Index (GSI). Self-reported questionnaire evaluates the following 9 symptoms: phobic anxiety, obsessive-compulsive disorder (OCD), depression, aggression, anxiety, paranoia, sensitivity, somatization, and psychotic tendency. The total score is assessed as the GSI and $GS > 1$ indicates psychological distress. We considered psychological distress to be equivalent to the GSI, which is obtained by dividing 90 questions by 90. Questions this checklist is with five answer items (0=never, 1=a little bit, 2=moderately, 3=quite a bit, 4=very). The average of each subcomponent is between 0-4. An average above 1 in GSI, as well as in each subcomponent is morbidity (16). Its reliability in the study of Anisi et al. (17) Using internal consistency coefficients and test-re test with Cronbach's alpha method and Pearson correlation were obtained 0.98 and 0.82, respectively.

Ethical considerations

The Ethics Committee of Babol University of Medical Sciences approved the study (IR. MUBABOL. REC.2014.4232). Informed consent form was signed by students before the study on the declaration of Helsinki.

Data analysis

Data analysis was done by the statistical package for the social sciences (SP, version 22.0, SPSS Inc, Chicago, Illinois, USA) software package. Therefore, a t test was used for differences between the two groups, which were significant. Also, the t test and chi-square test were used for differences demographic/menstrual characteristics and psychological distress in members. Pearson Chi-Square and ANOVA tests were used to investigate the relationship between variables and dysmenorrhea severity in the group with dysmenorrhea. Also, the predictive factors of dysmenorrhea were examined using multiple logistic. The significance level of the tests was considered 0.05.

Results

The demographic/menstrual characteristics of the students are presented in Table 1.

Table 1: Demographic and menstrual characteristics in population study

Characteristic	With dysmenorrhea (n=194)	Without dysmenorrhea (n=150)	P
Age (Y)	19.35 ± 0.78	19.23 ± 0.75	0.254
BMI (kg/m ²)	21.83 ± 3.17	21.98 ± 3.35	0.913
Menstruation			
Menarche age (Y)	13.05 ± 1.46	13.00 ± 1.23	0.089
Menstrual cycle interval (days)	28.79 ± 4.26	28.8 ± 4.30	0.161
Menstrual cycle duration (days)	6.52 ± 1.08	6.52 ± 1.33	0.150
Residence			
Urban	97 (50.0)	77 (51.3)	
Rural	32 (16.5)	23 (15.4)	0.984
Dormitory	65 (33.5)	50 (33.3)	
Father's education			
Under the diploma	53 (27.3)	53 (35.3)	
Diploma	77 (39.7)	51 (34.0)	0.267
College	64 (33.0)	46 (30.7)	
Mother's education			
Under the diploma	97 (50.0)	162 (47.1)	
Diploma	79 (40.70)	135 (39.2)	0.026
College	18 (9.3)	47 (13.7)	
Family history of dysmenorrhea			
No	30 (15.5)	105 (70.0)	
Yes	164 (84.5)	45 (30.0)	0.001
Satisfaction with family income			
High	49 (25.3)	46 (30.7)	
Middle	141(72.7)	101 (67.3)	0.538
Low	4 (2.1)	3 (2.0)	

In the group with dysmenorrhea on the VMS, there was mild dysmenorrhea in 62 students (32.0%), moderate dysmenorrhea in 101 students (52.1%), and severe dysmenorrhea in 31 students (16.0%), which was a significant difference ($P<0.001$). Also, 58.8% of students with dysmenorrhea used medication to relieve pain. In the group with dysmenorrhea relationship between dysmenorrhea severity and demographic characteristics, presented in the Table 2. Results showed that severity dysmenorrhea was significantly associated with family history of dysmenorrhea and mother's education ($P=0.012$ and $P=0.037$, respectively).

Table 2: Dysmenorrhea severity and demographic characteristics in the group with dysmenorrhea

Characteristic	Mild (n=62)	Moderate (n=101)	Severe (n=31)	P value [†]
BMI (kg/m ²)	21.56±2.88	22.21±3.42	21.11±2.73	0.174
Residence				
Urban	32 (33)	47 (48.5)	18 (18.6)	
Rural	9 (29)	20 (64.5)	2 (6.5)	0.483
Dormitory	21 (31)	34 (51.5)	11 (16.7)	
Father's education				
Under the diploma	15 (28.3)	34 (64.2)	4 (7.5)	
Diploma	30 (39)	33 (42.9)	14 (18.2)	0.089
College	17 (26.6)	34 (53.1)	13 (20.3)	
Mother's education				
Under the diploma	31 (32)	55 (56.7)	11 (11.3)	
Diploma	23 (29.1)	41 (51.9)	15 (19)	0.037
College	8 (44.4)	5 (27.8)	5 (27.8)	
Family history of dysmenorrhea				
Yes	45 (30.8)	77 (52.7)	24 (16.5)	0.012
No	17 (35.4)			
Satisfaction with income		24 (50.0)	7 (14.6)	
High	14 (28.6)	27 (55.1)	8 (16.3)	0.837
Middle	25(31.2)	40 (50.0)	15 (18.7)	
Low	23 (35.4)	34 (52.3)	8 (12.3)	

Data are presented as mean ± SD or n (%). †; The data were evaluated using Chi-square and ANOVA tests and BMI; Body mass index.

Table 3 shows psychological distress in the population study. The mean GSI of the SCL-90 score in the student with and without dysmenorrhea was $1.02 ± 0.42$ and $0.34 ± 0.15$ respectively ($P<0.001$). Also, in the dysmenorrhea group with psychological distress ($GSI>1$), somatization associated with pain intensity ($P=0.033$) and pain medication ($P=0.039$), OCD with pain medication ($P=0.015$), aggression with family income satisfaction ($P=0.008$), phobic anxiety with pain intensity ($P=0.006$), and psychoticism associated with menarche ($P=0.002$) and menstrual regulation ($P=0.005$). The results of logistic regression for $GSI>1$ in the group with dysmenorrhea are shown in Table 4. Six factors including BMI, pain intensity, residence, mother's education, father's education and a family history of dysmenorrhea were included in the analysis. According to this analysis, the strongest

predictors of GSI>1 were a family history of dysmenorrhea and mother's education (OR=2.33, 95% CI: 1.43-4.15 and OR=0.45, 95% CI: 0.24-0.87, respectively).

Table 3: Psychological distress in population study

Psychological score	With dysmenorrhea (n=194)	Without dysmenorrhea (n=150)	P value [†]
SCL-90-R			
Somatisation	0.91 ± 0.51	0.35 ± 0.24	0.001
OCD	1.23 ± 0.51	0.43 ± 0.23	0.001
Interpersonal sensitivity	1.11 ± 0.56	0.44 ± 0.26	0.001
Depression	1.12 ± 0.61	0.33 ± 0.19	0.001
Anxiety	0.95 ± 0.58	0.32 ± 0.21	0.001
Hostility	1.01 ± 0.56	0.31 ± 0.22	0.001
Phobic anxiety	0.71 ± 0.45	0.27 ± 0.25	0.001
Paranoid ideation	1.31 ± 0.64	0.39 ± 0.26	0.001
Psychoticism	0.85 ± 0.46	0.22 ± 0.17	0.001
GSI	1.02 ± 0.42	0.34 ± 0.15	0.001

Data are presented as mean ± SD. SCL-90-R; Symptom Checklist-90-Revised, OCD; Obsessive-compulsive disorder, GSI; Global severity index, and †; The data were evaluated using t tests.

Table 4: Predictive factors of GSI>1 in multiple logistic regression analysis

Variable	OR	95% CI	P value [†]
BMI (kg/m ²)	1.11	0.66-1.87	0.690
Pain intensity	1.41	0.82-2.42	0.207
Residence	0.92	0.65-1.29	0.642
Mother's education	0.45	0.24-0.87	0.024
Father's education	1.32	0.57-2.33	0.521
Family history of dysmenorrhea	2.33	1.43-4.15	0.001

GSI; Global severity index, OR; Odds ratio, CI; Confidence interval, BMI; Body mass index, and †; The data were evaluated using multiple logistic regressions.

Discussion

Our study revealed that the mean global GSI in the student with and without dysmenorrhea was 1.02 ± 0.42 and 0.34 ± 0.15, respectively. In line with our study and based on some researches, students with dysmenorrhea reported mental distress. The intensity of dysmenorrhea and PMS were related to psychological distress (7, 18). Also, Fukushima et al. (19) reported that 15% of medical students had dysmenorrhea. In another study, researchers reported 70.8% of dysmenorrhea (3). One study reported that students with dysmenorrhea may not have adequate social support, and inadequate social support in students was attributed to high levels of alexithymia in this population. The researchers stated that many patients with alexithymia have relationship disorders (7). We can justify that dysmenorrhea cause psychological distress. The pain and discomfort caused by dysmenorrhea cause the student to become tired and affect her mood. Also, the student force and potency is reduced because of interaction with family and friends changes. This communication problem can cause psychological distress. Students must be under strong family support during menstruation. If this support is not provided, they will suffer, which can lead to a

vicious cycle and increase their sense of pain.

Our finding showed that severity dysmenorrhea was significantly associated with mother's education not father. In students with a mother college education, mild dysmenorrhea was more common than moderate and severe dysmenorrhea. Also, moderate dysmenorrhea was more in people who had a positive a family history of dysmenorrhea in the core family members than students who did not have a family history of dysmenorrhea. This states that heredity play a role in dysmenorrhea. Bhusal et al. (20) reported that adolescents' level of knowledge about menstrual health was significantly related to living in rural areas, studying in private schools, mother's education to the extent of reading and writing, father's education at the level of 10, and living alone with mother. In other studies, primary dysmenorrhea was not related to maternal and paternal education but was related to BMI (21, 22). On the other, some studies reported that it was associated with a family history of dysmenorrhea (23, 24). Socio-cultural issues in any society can affect student dysmenorrhea in different ways. We should note that mother's education can be effective in supporting girls during dysmenorrhea. Indeed, this indicates that the mother's higher education can be effective in the care and health of their girls. The lack of signification between the father's education and the severity of dysmenorrhea may be due to the less relationship of fathers with their daughters' menstrual problems in Iran, which indicates a cultural issue.

The present study showed that some SCL-90 subscales were associated with pain intensity, pain medication, family income satisfaction, menarche and menstrual regulation. In line with our research and based on several researches, there are relationships between primary dysmenorrhea with pain medication, menarche and social class (3, 12, 25). Medication reduces the symptoms of dysmenorrhea as well as non-drug treatment such as relaxation. Pain management can alleviate the pain and suffering caused by primary dysmenorrhea and lead to peace of mind (26-28).

According to our study, the logistic regression showed that the strongest predictors of GSI>1 were a family history of dysmenorrhea and mother's education. In line with our study, the multiple logistic regression in one study showed that social support, alexithymia, neurotic personality, and a family history of dysmenorrhea were significantly associated with dysmenorrhea that were as its main risk factors. Low social support was strongest predictor of primary dysmenorrhea in this study. Also, alexithymia was second strongest predictor of primary dysmenorrhea (7). Alexithymia has negative effect and is associated with chronic pain (29). Many factors affect menstruation, including social demographic issues, sever physical exercise, sleep disorders, and psychological stress (30, 31). Stress is a key problem in many menstrual irregularities (32). In one study, sleep hours, alcohol intake, perceived stress, BMI and a history of diagnosed anemia were risk factors associated with menstrual

irregularity (33). Also, in one study which was done in Pakistan, 34.1% of students had menstrual changes (34). Moreover, a study in China determined that severe stress were related to menstrual disorder (31). Conversely, One study in India reported that there is no relation between severe stress and menstrual disorder (35). It should be stated that studies reported that self-medication without consulting health professionals in young women with period disorders is very usual (36).

Certain limitations should be said. We have used a self-administered questionnaire, and data were reported on the memory. They may have not provided the correct information. This study was done only on the student aged 18 to 20 years which the results can't be generalized to older ages. Another limitation of the study is that the study was carried out in students from a single Iranian medical university. If a larger study had been performed, more risk factors would probably have been identified. The cross-sectional quiddity of this research avoids any consequence about causal property. Interventional and prospective cohort researches are a more valid track of evaluating correlation between different risk factors and menstrual pain. Thus, we suggest that future studies would be done in this field.

Conclusion

Finally, our results showed that dysmenorrhea is associated with psychological distress. We need to promote the awareness of students, health professionals, and physicians about the psychological issues of menstruation. Psychological interventions and counseling in addition to drug treatment are suggested to treatment of primary dysmenorrhea. Therefore, it is necessary to use strategies and health policies to decrease psychological distress of women with dysmenorrhea.

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Authors' Contributions

H.A.-R.; Study conception and design, Literature Search, data Collection, manuscript preparation, analysis and interpretation of data and drafting of manuscript. F.Kh.; Study conception and design, manuscript preparation. M.F.; Study conception and design, manuscript preparation, analysis and interpretation of data and drafting of manuscript. Sh.O.; Literature Search, data collection, manuscript preparation. Z.B.; Study conception and design, manuscript preparation. M.H.A.; Analysis and interpretation of data. All authors read and approved the final manuscript.

References

- Vlachou E, Owens DA, Lavdaniti M, Kalemikerakis J, Evagelou E, Margari N, et al. Prevalence, wellbeing, and symptoms of dysmenorrhea among university nursing students in Greece. *Diseases*. 2019; 7(1): 5.
- Ameade EPK, Amalba A, Mohammed BS. Prevalence of dysmenorrhea among University students in Northern Ghana; its impact and management strategies. *BMC Womens Health*. 2018; 18(1): 39.
- Tsamara G, Raharjo W, Putri EA. The relationship between life style with the incidence of primary dysmenorrhea in medical faculty female students of tanjungpura university. *J Nas Ilmu Kesehat*. 2020; 2(3): 130-140.
- Bernardi M, Lazzeri L, Perelli F, Reis FM, Petraglia F. Dysmenorrhea and related disorders. *F1000Res*. 2017; 6: 1645.
- Salmalian H, Saghebi R, Moghadamnia AA, Bijani A, Faramarzi M, Amiri FN, et al. Comparative effect of thymus vulgaris and ibuprofen on primary dysmenorrhea: a triple-blind clinical study. *Caspian J Intern Med*. 2014; 5(2): 82.
- Adib-Rad H, Basirat Z, Bakouei F, Moghadamnia AA, Khafri S, Kotenaei ZF, et al. Effect of ginger and novafen on menstrual pain: A cross-over trial. *Taiwan J Obstet Gynecol*. 2018; 57(6): 806-809.
- Faramarzi M, Salmalian H. Association of psychologic and nonpsychologic factors with primary dysmenorrhea. *Iran Red Crescent Med J*. 2014; 16(8): e16307.
- Iacovides S, Avidon I, Baker FC. What we know about primary dysmenorrhea today: a critical review. *Hum Reprod Update*. 2015; 21(6): 762-778.
- 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.
- Ambresin A-E, Belanger RE, Chamay C, Berchtold A, Narring F. Body dissatisfaction on top of depressive mood among adolescents with severe dysmenorrhea. *J Pediatr Adolesc Gynecol*. 2012; 25(1): 19-22.
- Pakpour AH, Kazemi F, Alimoradi Z, Griffiths MD. Depression, anxiety, stress, and dysmenorrhea: a protocol for a systematic review. *Syst Rev*. 2020; 9(1): 1-6.
- Jha N, Bhadoria AS, Bahurupi Y, Gawande K, Jain B, Chaturvedi J, et al. Psychosocial and stress-related risk factors for abnormal menstrual cycle pattern among adolescent girls: a case-control study. *J Educ Health Promot*. 2020; 9: 313.
- Ortiz MI. Primary dysmenorrhea among Mexican university students: prevalence, impact and treatment. *Eur J Obstet Gynecol Reprod Biol*. 2010; 152(1): 73-77.
- 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): 138-145.
- Firozi MZT. Primary dysmenorrhea and herbal medicine. *J Med Plants*. 2016; 15(60): 58-65.
- Derogatis LR, Unger R. Symptom checklist-90-revised. *Corsini encyclopedia of psychology*. 2010: 1-2.
- Anisi J, Akbari F, Madjian M, Atashkar M, Ghobani Z. Standardization of mental disorders symptoms checklist 90 revised (SCL-90-R) in army staffs. *Journal of Military Psychology (JMP)*. 2011; 2(5): 29-37.
- Wang C, Liu Y, Dun W, Zhang T, Yang J, Wang K, et al. Effects of repeated menstrual pain on empathic neural responses in women with primary dysmenorrhea across the menstrual cycle. *Hum Brain Mapp*. 2021; 42(2): 345-356.
- Fukushima K, Fukushima N, Sato H, Yokota J, Uchida K. Association between nutritional level, menstrual-related symptoms, and mental health in female medical students. *PLoS One*. 2020; 15(7): e0235909.
- Bhusal CK, Bhattacharai S, Kafle R, Shrestha R, Chhetri P, Adhikari K. Level and associated factors of knowledge regarding menstrual hygiene among school-going adolescent girls in Dang district, Nepal. *Adv Prev Med*. 2020; 2020: 8872119.
- Al-Matouq S, Al-Mutairi H, Al-Mutairi O, Abdulaziz F, Al-Basri D, Al-Enzi M, et al. Dysmenorrhea among high-school students and its associated factors in Kuwait. *BMC Pediatr*. 2019; 19(1): 1-12.
- Momma R, Nakata Y, Sawai A, Takeda M, Natsui H, Mukai N, et al. Comparisons of the prevalence, severity, and risk factors of dysmenorrhea between Japanese female athletes and non-

- athletes in universities. *Int J Environ Res Public Health*. 2022; 19(1): 52.
23. Azagew AW, Kassie DG, Walle TA. Prevalence of primary dysmenorrhea, its intensity, impact and associated factors among female students' at Gondar town preparatory school, northwest Ethiopia. *BMC Womens Health*. 2020; 20(1): 5.
 24. 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): 1312-1317.
 25. Anikwe CC, Mamah JE, Okorochukwu BC, Nnadozie UU, Obarezi CH, Ekwedigwe KC. Age at menarche, menstrual characteristics, and its associated morbidities among secondary school students in Abakaliki, southeast Nigeria. *Heliyon*. 2020; 6(5): e04018.
 26. 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.
 27. Dias SFL, Pereira LCA, Oliveira APd, Santos RFd, Nunes LCC. Scientific and technological prospection on transdermal formulations and complementary therapies for the treatment of primary dysmenorrhea. *Expert Opin Ther Pat*. 2019; 29(2): 115-126.
 28. Çelik AS, Apay SE. Effect of progressive relaxation exercises on primary dysmenorrhea in Turkish students: A randomized prospective controlled trial. *Complement Ther Clin Pract*. 2021; 42: 101280.
 29. Aaron RV, Fisher EA, Palermo TM. Alexithymia in adolescents with and without chronic pain. *Rehabil Psychol*. 2019; 64(4): 469-474.
 30. Rafique N, Al-Sheikh MH. Prevalence of menstrual problems and their association with psychological stress in young female students studying health sciences. *Saudi Med J*. 2018; 39(1): 67-73.
 31. Ansong E, Arhin SK, Cai Y, Xu X, Wu X. Menstrual characteristics, disorders and associated risk factors among female international students in Zhejiang Province, China: a cross-sectional survey. *BMC womens health*. 2019; 19(1): 1-10.
 32. Dehkordi ZR. 53: Evaluate the effect of perceived stress on dysmenorrhea. *BMJ Open*. 2017; 7 Suppl 1: bmjopen-2016-015415.53.
 33. Zeru AB, Gebeyaw ED, Ayele ET. Magnitude and associated factors of menstrual irregularity among undergraduate students of Debre Berhan University, Ethiopia. *Reprod Health*. 2021; 18: 101.
 34. Natt AM, Khalid F, Sial SS. Relationship between examination stress and menstrual irregularities among medical students of rawalpindi medical university. *JRMC*. 2018; 22(S-1): 44-47.
 35. Nagma S, Kapoor G, Bharti R, Batra A, Batra A, Aggarwal A, et al. To evaluate the effect of perceived stress on menstrual function. *J Clin Diagn Res*. 2015; 9(3): QC01-QC03.
 36. Parra-Fernández ML, Onieva-Zafra MD, Abreu-Sánchez A, Ramos-Pichardo JD, Iglesias-López MT, Fernández-Martínez E. Management of primary dysmenorrhea among university students in the South of Spain and family influence. *Int J Environ Res Public Health*. 2020; 17(15): 5570.
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