Women. Health. Bull. 2022; 9(4)

Published online 2022 October.

Original Article

Study of the Severity of Primary Dysmenorrhea and its Associated Characteristics among University Students

Salimeh Nezamivand Chegini[1], MSc; Parvin Abedi[2], PhD; Masoumeh Yaralizadeh[2]*, MSc; Saeed Ghanbari[3], PhD

[1]Department of Midwifery, Tabriz University of Medical Sciences, Tabriz, Iran
[2]Menopause Andropause Research Center, Department of Midwifery, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
[3]Department of Biostatistics and Epidemiology, School of Public Health, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

*Corresponding author: Masoumeh Yaralizadeh, MSc; Menopause Andropause Research Center, Department of Midwifery, Ahvaz Jundishapur University of Medical Sciences, Golestan St, Postal code: 61357-33337, Ahvaz, Iran. **Tel:** +98 61 33738331; **Fax:** +98 61 33738333; **Email:** M.yaralizade@gmail.com

Received: June 25, 2022; **Revised:** July 30, 2022; **Accepted:** September 03, 2022

Abstract

Background: Primary dysmenorrhea is one of the most prevalent issues in women's health care, which affects half of the population in the reproductive age. The present research aimed to evaluate the severity of primary dysmenorrhea and its associated characteristics among the university students in Ahvaz, Iran.
Methods: In this cross-sectional descriptive study, 80 college students suffering from dysmenorrhea were randomly recruited. All the required data were gathered via demographic questionnaire, Visual Analoge Sclae (VAS), Pictorial Blood Assessment Chart (PBAC), and Symptom Severity Score (SSS) during two consecutive menstrual cycles from Aprill 20 to June 20, 2016. Furthermore, descriptive statistics (frequency and mean) and analytical statistics (Pearson's correlation coefficient) were used. $P<0.05$ was considered as the level of significance.
Results: The mean±SD of menstrual pain of the participants was 6.6±1.5 out of 10. Most of them (61.2%) suffered from moderate dysmenorrhea. Mean±SD of their age was 21.1±2.0 years and their age at menarche was 12.9±1.2 years. A significant number of the participants (85%) claimed to use drugs to relieve the menstrual pain, with the most common onebeing Ibuprofen (41.2%), usually taken orally at the onset of menstruation. Moreover, analysis of the results revealed a significant correlation among all the items of Symptom Severity Score (SSS) and pain severity ($P<0.001$), except sensitivity and depression. However, the duration and amount of menstrual bleeding was not significantly correlated with pain severity.
Conclusions: Choosing the right approach to managing and educating women with menstrual pain-associated symptoms can reduce the adverse impact of dysmenorrhea on their quality of life.

Keywords: Dysmenorrhea, Menstruation, College health, Premenstrual syndrome, Menstrual pain, Students

How to Cite: Nezamivand Chegini S, Abedi P, Yaralizadeh M, Ghanbari S. Study of the Severity of Primary Dysmenorrhea and its Associated Characteristics among University Students. Women. Health. Bull. 2022;9(4):234-242. doi: 10.30476/WHB.2022.96223.1188.

1. Introduction

Menstrual characteristics has attracted a great deal of attention in the field of women's health. That is because the characteristics of the menstrual cycle can be used as a non-invasive clinical marker for indicating reproductive function and health (1).

Dysmenorrhea is the Greek word for painful menstruation, characterized as a periodic menstrual cramping pain. It can be classified into two categories, namely primary and secondary dysmenorrhea. Primary dysmenorrhea is one of the most common problems seen in women's health care (1), which is defined as the pain during menses in the absence of an identifiable pathologic lesion. This problem may start 1-2 days before menstruation and continue for 2-4 days during that. On a number of occasions, dysmenorrheic girls have heavy bleeding and premenstrual symptoms (2-4).

Primary dysmenorrhea is a disorder that affects half of the women in their reproductive age. Reports of dysmenorrhea are greatest among individuals in their late teens and 20s, with reports usually declining with age. The most frequently experienced dysmenorrhea symptoms are tension, irritability, depression, anxiety, bloating, abdominal cramps, tender breast, joint pain, and headaches (5, 6). Due to menstrual pain and its related problems, 14% of young girls cannot attend school, which increases to 50% in severe cases. The prevalence of this issue in adolescent females has been reported to be 67.2% by one study and 90% by another one (7-10).

Dysmenorrheal cycle develops a variety of

physical and psychological symptoms, which may require medical intervention in serious cases. Although no certain reason has been identified behind primary dysmenorrhea, one of the accepted theories about this is the overproduction of endometrial prostaglandin (PG) (11).

Woman with dysmenorrhoea have a relatively high concentration of PGF2α in menstrual fluid, which can be associated with other reproductive problems, such as heavy menstrual bleeding or menstrual symptoms (9). In most women with primary dysmenorrhea, there is increased endometrial secretion of menstrual PGF2α during the menstrual phase (10, 11). The release of PGs into the menstrual fluid is a continuous process (12); that is, the amount of menstrual fluid and PGs varies throughout any time window. The intensity of the menstrual cramps and dysmenorrhea-associated symptoms are directly proportional to the amount of PGF2α released (12-14).

Since menstrual pain is the most common self-experienced and periodic disorder in women's reproductive health and is worthy of consideration due to its effects on daily activities and socioeconomic conditions, we aimed to evaluate the pattern of dysmenorrheal cycle among the students residing in the dormitories of Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

2. Methods

The subjects of this cross-sectional study were all the female students with primary dysmenorrhea living in any of the dormitories of Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran. Recruitment was done from Aprill 20 to June 20, 2016.

Data collection tools in this study included a questionnaire based on reproductive history and demographic characteristics and questionnaires for assessing menstrual pain (Visual Analog Scale), menstrual symptoms (Symptom Severity Scale), and menstrual bleeding (Pictoria Blood Loss Assessment Chart). All the questionnaires utilized in this study are standard, whose validity and reliability have been confirmed. Intraclass correlation coefficient (ICC) for Higham chart, Visual Analog Scale (VAS), and Symptom Severity Scale (SSS) are 0.74, 0.96, and 0.81, respectively. CVR and CVI for all the questionnaires are 0.60 and 0.80, respectively (15-17).

VAS is a scale for estimating pain intensity; in this scale, numbers range from zero (no pain) to 10) maximum imaginable pain), which should be specified by the patient. Pain is classified into three types: slight (1-3), moderate (4-6), and severe (7-9). The SSS is also a valid and reliable questionnaire for evaluating the severity of menstrual symptoms. This questionnaire consists of eight items on a five-point Likert scale. The pictorial blood assessment chart (PBAC) is a method for evaluation of menstrual blood loss; it is a tabular chart where the number of menstrual days is in the horizontal row while in its vertical row, blood-stained pads are marked at three degrees of mild, moderate, and severe, as well as the excretion of the blood clots. A lightly stained pad is scored 1, a moderately stained pad 5, and a pad saturated with blood gets 20. For each small clot, score 1 and for each great clot, score 5 is considered. Individuals mark each time changing the pad according to the amount of saturation with blood in the specified area. At the end of the menstruation, each sign was multiplied by its score, the numbers obtained were combined, and the total score was calculated (18).

Considering 6.8 for mean and 1.4 for standard deviation (SD) of menstrual pain intensity, based on the results of a study carried out at the same setting (6), $\alpha=0.05$, $\beta=0.10$ and 15% possible drop out, the sample size was calculated to be 80. Therefore, we examined 80 people meeting the inclusion criteria.

The dormitories were selected randomly but the subjects at the dormitories were recruited through convenience sampling. In order to select the subjects, the researcher attended at the students' rooms in the selected dormitories. She explained the objectives of the study to the students in each room. She asked those who were willing to participate and gave a positive answer if they were suffering from painful menstruations. The researcher filled in an anonymous questionnaire consisting of questions designed to determine eligible people. The subjects were selected based on demographic, menstrual, and reproductive questionnaires. Out of 140 students interested in participation, 80 eligible students were enrolled into the study after signing a written informed consent.

The participants were instructed how to complete a self-assessment questionnaire during

the two continuous menstrual cycles. The first part of the questionnaire included questions related to demographic and reproductive information and the second one focused on menstruation-related factors, such as pain intensity, severity of menstrual symptoms, number of consumed analgesics, duration of rest (minute), as well as duration and amount of menstrual bleeding.

The score of menstrual pain intensity at each cycle was calculated in two ways: 1. the mean pain intensity during two days, the days with higher pain intensity out of the five days (2 days before and 3 days after staring menstruation); 2. the mean pain intensity during the five days. The rest of each cycle was calculated via the sum of the recorded rest due to pain during the five days. The severity of menstrual symptoms was calculated with SSS in each cycle, subsequent to which the average of two menstrual cycles was evaluated. The participants were asked to mark the severity of their menstrual symptoms at four times (two days before and two days after the start of menstrual bleeding) in the questionnaire.

Before entering the study, all the participants signed a written consent form. Moreover, they could withdraw from the study at any time. The current research was approved scientifically by the research committee of Ahvaz University of Medical Sciences and ethically by the Ethic Committee of the university with the code of AJUMS.REC.1394.347 before recruitment of participants.

2.1. Statistical Analysis

The completed questionnaires were coded and entered into SPSS version 19.0. Descriptive statistics for quantitative variables are indicated as mean and standard deviation (SD) and qualitative data are presented as frequencies and percentages. To investigate the correlation between the variables, Pearson's correlation coefficient and Chi-square test ($\chi 2$) were utilized. $P<0.05$ was considered as the level of significance. The statistical significance of the intergroup differences was determined using the $\chi 2$ test. Factors related to the adolescents' menstruation were analyzed with multiple logistic regression.

3. Result

80 subjects with primary dysmenorrhea participated in the study. All 80 eligible members filled the questionnaires during two consecutive menstrual cycles. The inclusion criteria were having a regular menstrual cycle, having moderate or severe primary dysmenorrhea (pain score of 5 to 9 on the visual analog scale in the previous cycles), and being single. The exclusion criteria were having a history of any chronic diseases, consuming Non-steroidal anti-inflammatory drugs and oral contraceptives, having pain during the whole bleeding period or all over the cycle, and having genital diseases. Mean±SD of the participants' age was 21.1±2.0 years and their age ranged between 18 to 30 years. Mean±SD of body mass index (BMI) was 22.5±2.8 Kg/m^2 (Table 1). Their mean±SD age at menarche was 12.9±1.2 years, ranging from 10 to 18. Most students' menarche age (63.2%) was between 13 to 14 years (Figure 1). The average duration of menstrual cycle was 28.7 days, and the majority of students' duration of menstrual cycle (87.5%) was between 21 to 34 days. Mean±SD of their menstrual bleeding duration was 5.7±1.3 days, ranging from 3 to 10. Approximately, 68.7% of them had a menstrual bleeding duration of below 7 days while 83% had menstrual cycle durations of 5 days or more (Table 2).

The mean±SD of menstrual pain was 6.6±1.5. Moderate pain was observed in 61.2% of the students (n=49) whereas severe menstrual pain was found in 38.8% of them (n=31). About half of the students (47.4%) reported having a family history of dysmenorrhea (Table 2). The most common analgesic used was reported to be Ibuprofen (Figure 2).

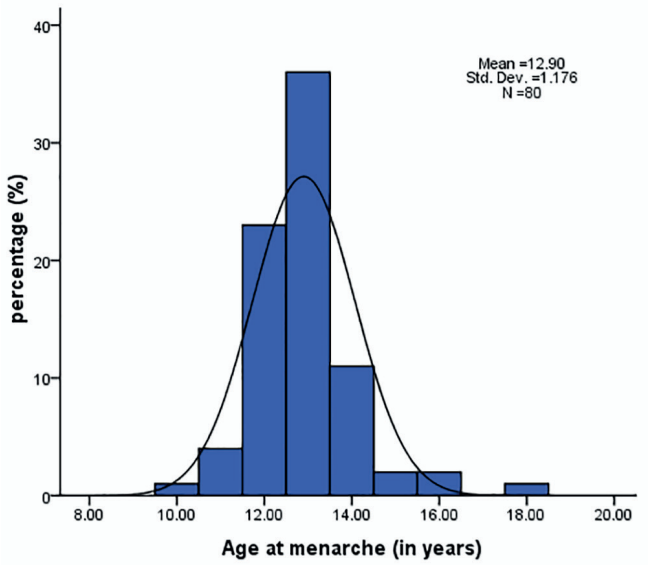

Figure 1: The figure shows the bar chart displaying the age at menarche among the participants.

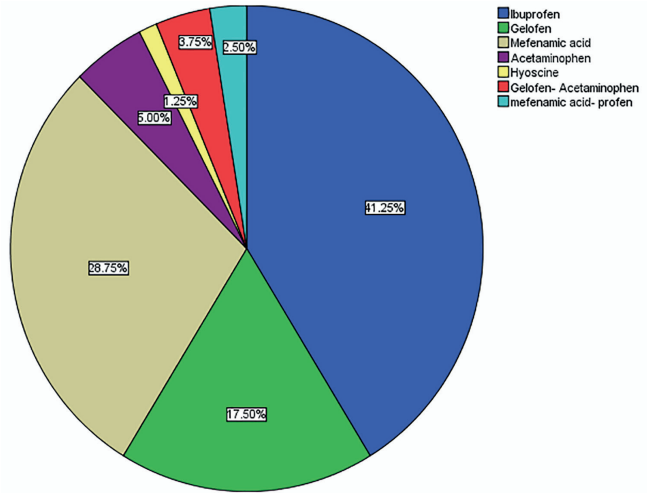

Figure 2: The figure shows the pie chart displaying the percentage of analgesics types among the participants.

Two or more symptoms were detected in 91.5% of the participants. The mean±SD of menstrual symptoms according to SSS was as follows: back pain: 11.7±2.9; abdominal pain: 11.4±2.8; sensitivity: 9.6±1.8; general pain: 9.2±2.6; cramp: 8.9±3.9; depression: 7.9±2.3; foot pain: 7.4±0.3; headache: 6.6±1.8. The most prevalent menstrual symptoms was back pain (Figure 3).

Approximately, 22% of the participants graded their dysmenorrheal symptoms as mild, 68% as severe, and only 9.6% of the participants reported very severe menstrual pain. Tables 1 and 2 depict the other characteristics of the participants. Furthermore, the duration (P=0.07) and amount of menstrual bleeding (P=0.13) were not significantly correlated

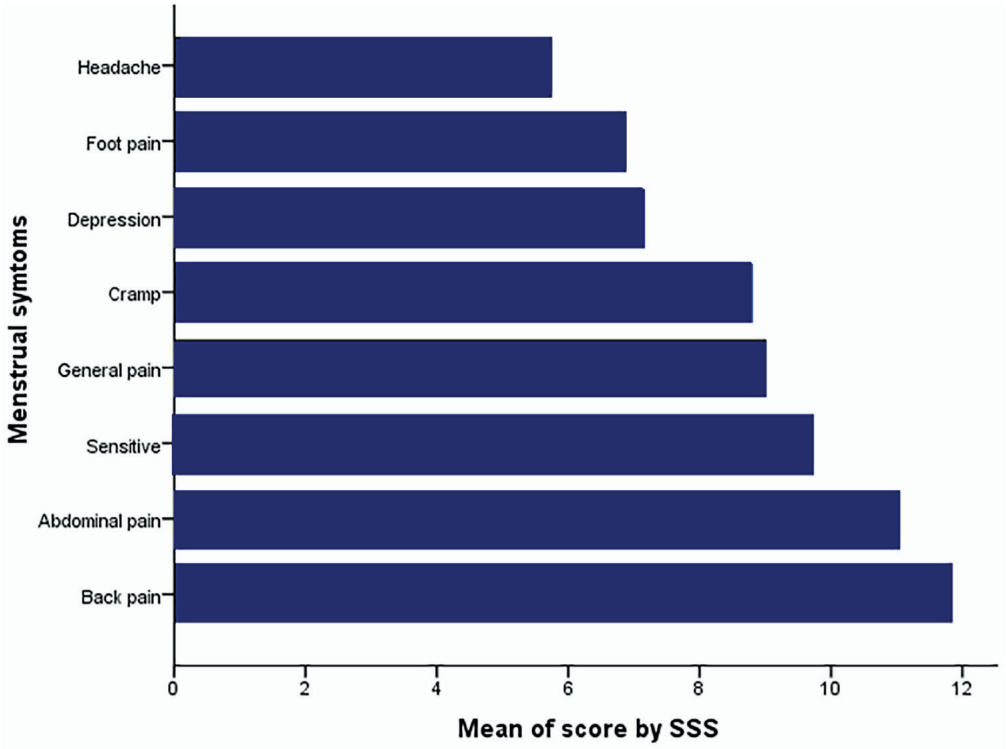

Figure 3: The figure shows the bar chart displaying the mean score of menstrual symptoms among the particpants.

Table 1: Socio-demographic characteristics of the subjects

Characteristics	Intensity of primary dysmenorrhea			P
	Moderate (n=49)	Severe (n=31)	Total (n=80)	
Age in years	21.2±2.2	20.8±1.8	21.1±2.0	0.41
BMI in kg/m^2	22.6±3.0	22.4±2.3	22.5±2.8	0.79
Educational status				0.51
Bachelor of science	20 (25)	14 (17.6)	34 (42.6)	
Higher	29 (36.2)	17 (21.2)	46 (57.4)	
Regular exercise				0.81
Yes	13 (16.25)	9 (11.25)	22 (27.5)	
No	36 (45)	22 (13)	58 (72.5)	

Data indicate mean±standard deviation or number (%). BMI: body mass index

Table 2: Menstrual characteristics among students with primary dysmenorrhea (N=80)

Menstrual Characteristics	N	%	Menstrual Characteristics	N	%
Menstrual flow, Mean±SD		56.0±1.1	Duration of pain, Mean±SD		4.8±2.2
Less than 50 cc	32	40	2 daays before menstruation	17	21.2
50-69 cc	38	47.5	1 day before menstruation	34	42.5
70 cc or more	10	12.5	With menstruation	29	36.2
2 monthly Number of pads, Mean±SD		25.2±4.1	Interference with daily activities		
Minimum	18		Often/ Always	51	63.8
Maximum	37		Rarely/ Never	29	36.2
Duration of flow (day), Mean±SD		6.2±1.1	Duration of rest (min), Mean±SD		0.90±0.5
Beginning of menstrual symptoms			Duration of menstrual cycle, Mean±SD		28.7±1.2
Before menstruation	64	72.5	Minimum	25	
When menstruation begins	14	17.5	Maximum	30	
After menstruation	8	10	Mode	30	
Family history of dysmenorrhea			Number of analgesics during 2 cycle, Mean±SD		6.2±4.2
Yes	52	65	Less than 5	23	28.7
No	19	23.8	5-10	19	23.7
Don't know	9	11.2	10 or more	38	47.5
Maximum pain			Using analgesics (day)	3.3	1.6
Before menstruation	10		Two day	23	28.7
After menstruation	6		Three days or more	57	71.3
Taking analgesics			Time of using analgesics		
Often/Always	68	85	Before menstruation	13	16.2
Rarely	12	15	Timely of menstruation	33	41.2
Age at menarche, Mean±SD		12.9±1.2	After menstruation	34	42.5
Time of menstrual pain			First dysmenorrhea		
Before of menstruation	47	58.7	1-6 month after menarche	43	53.8
When menstruation begins	24	30	7-48 month after menarche	26	32.5
After of menstruation	9	11.2	Don't remember	11	13.8
Menstrual pain intensity*, Mean±SD	6.6	1.5	Menstrual symptoms severity scores**, Mean±SD	9.1	1.8

Values are presented as N and % or Mean±SD. * Each person reported average of pain intensity during 2 days before and 3 days after menstruation during two continus cycles by VAS, mean of VAS scores was considered as menstrual pain intensity ** Each person reported their severity of menstrual symtoms during 4 days (2 days before and 2 days after menstruation) during two continus cycles by SSS, mean of scores was considered as menstrual symptoms severity

Table 3: Correlation between intensity of primary dysmenorrhea with amount/duration of menstrual bleeding among the participating of study

Outcome	Intensity of primary dysmenorrhea			P value
	Moderate (5-7) n (%)	Severe (7-10) n (%)	Total n (%)	
Amount of menstrual bleeding				0.13
30-60 cc	31 (38.7)	15 (18.8)	46 (57.5)	
60 cc or more	18 (22.5)	16 (20)	34 (42.5)	
Duration of menstrual bleeding				0.07
3-5 days	15 (18.8)	4 (5)	19 (23.8)	
5 days or more	34 (42.5)	27 (33.7)	61 (76.2)	

with the severity of menstrual pain (Table 3). Nonetheless, there was a significant correlation between all the items of SSS and the severity of menstrual pain (P<0.001), except for sensitivity (P=0.34) and depression (P=0.07) (Table 4).

4. Discussion

This study aimed to evaluate the pattern of dysmenorrheal cycle among the students suffer from primary dysmenorrhea. In the following, the main findings of the current study and its comparison with other studies will be discussed. In our study, there was a significant correlation between all the items of SSS and the severity of menstrual pain, except for sensitivity and depression. The duration and amount of menstrual bleeding were not significantly correlated with the

Table 4: Correlation between intensity of primary dysmenorrhea with severity of menstrual symptoms among the participating of study

Menstrual symptoms	Intensity of primary dysmenorrhea			P	Menstrual symptoms	Intensity of primary dysmenorrhea			P
	Moderate n (%)	Severe n (%)	Total n (%)			Moderate n (%)	Severe n (%)	Total n (%)	
Cramp				<0.001	Deprission				0.07
Moderate	45 (57.5)	12 (15)	57 (72.5)		Moderate	43 (53.7)	26 (32.5)	69 (86.2)	
Severe	4 (5)	19 (22.5)	23 (27.5)		Severe	6 (7.5)	5 (6.3)	11 (13.8)	
Headache				0.03	Sensitive				0.34
Moderate	47 (58.8)	29 (36.2)	76 (95)		Moderate	32 (40)	22 (27.5)	54 (67.5)	
Severe	2 (2.5)	2 (2.5)	4 (5)		Severe	17 (21.25)	9 (11.25)	26 (32.5)	
Backpain				<0.001	General pain				<0.001
Moderate	32 (40)	2 (2.5)	34 (42.5)		Moderate	44 (55)	14 (17.5)	58 (72.5)	
Severe	17 (21.25)	29 (36.25)	46 (57.5)		Severe	5 (6.25)	17 (21.25)	22 (27.5)	
Footpain				<0.001	Abdominal pain				<0.001
Moderate	47 (58.8)	20 (25)	67 (83.8)		Moderate	30 (37.5)	2 (2.5)	32 (40)	
Severe	2 (2.5)	11 (13.7)	13 (16.2)		Severe	19 (23.8)	29 (36.2)	48 (60)	

severity of menstrual pain.

Menstrual pain is one of the most common complaints of younger women. Its may be accompanied by certain symptoms. Recently, the adverse effects of menstrual symptoms on womens' quality of life has attracted increasing scientific attention. A patient with primary dysmenorrhea generally experiences reproducible symptoms. Symptoms typically start several days before the menstruation begins (19-21).

Notably, this study demonstrated that 75% of the dysmenorrheal students experienced moderate menstrual symptoms while 25% had severe menstrual symptoms. The most prevalent menstrual symptoms were back pain, abdominal pain and sensivity, respectively. In this study, as previously mentioned, sensitivity was not related to the intensity of menstrual pain; however, it was the third most common symptom among students with primary dysmenorrhea. Eryilmaz and colleagues found that the prevalence of nausea and vomiting, diarrhea, dizziness, and headache was 12.2%, 8.1%, 8.1%, and 17.7%, respectively, among students (22). Dambhare and co-workers also reported that the most common menstrual symptom was headache (23). Our research studied dysmenorrheic students with regular menstrual cycles; thus, our results may not be generalized to other girls.

Menstrual pain is frequently self-treated by womens. At least, 70% took their medications incorrectly with regard to dosage, frequency and interval between taking medications. Polypharmacy was also common (8, 24, 25).

The mean of analgesic taken in this study was 3.2, and 6.2% of them used two types of analgesics during menstruation. Students need to be taught about other methods to cope with menstrual pain. All of the respondents in this study used analgesics for treatment of menstrual pain, with the most common medications for the treatment of dysmenorrhoea by 80 girls being Ibuprofen (41.2%), mefenamic acid (28.7%) and gelofen (17.5%). A substantial number of respondents (83.7%) disclosed that they used analgesic timely of bleeding or after bleeding.

The results confirmed that the use of drugs is the preferred treatment for dysmenorrhea in female students, all of whom self-prescribed these drugs. Self-medication for dysmenorrhoea is influenced by different factors, such as education, exposure to advertisements, family, and society. Therefore, we could recommend that students be educated regarding healthy lifestyle and complementary methods for pain relief.

The age of menarche is between 12-13 years; nonetheless, with the improvements in the nutrition and health status, it has declined recently (1). In the present study, the age range at menarche was 10 to18 years with a mean of 12.9 and a median of 13 years, which is very much in accordance with the findings of other studies (26-31).

Prolonged and heavy menstrual bleeding usually occurs among dysmenorrheal cycle. In this study, the amount of menstrual bleeding was less than 50 cc in 32 subjects (40%), 38 (47.5%) had 50-69 cc, and only 10 (12.5%) had 70 cc or more.

In the current work, the lenght of menstrual cyle among dysmenorrheal students was 28.7 with a minimum of 25 and a maximum of 30 days. Their cycle duration was mostly 30 days and duration of menstrual bleeding was 3-8 days with a mean of 6.2. Akhavanakbari and colleagues reported a statistically significant correlation between dysmenorrhea and bleeding volume (32). However, in this study, no statistically significant correlation were observed between the severity of pain and menstrual bleeding.

4.1. Limitations

There are some limiations in this study. The obtained findings provide information about menstrual cycle characteristics among college students in dormitories in an urban setting. Hence, we cannot generalize our results to the other female populations and the findings may not be same for girls from other segments of the society or for those from rural areas and a lower social class. Unfortunately, the duration of our work was relatively short and it only focused on students who had regular cycles with dysmenorrhea. Other limitations include the small number of participants and the use of self-reporting questionnaires. Therefore, further research in difference societies could provide more comprehensive information in this area.

5. Conclusions

In sum, the results of the current study revealed that physical menstrual symptoms were related to the severity of dysmenorrhea. Moreover, there was not any considerable association between psycholgical menstrual symptoms and amount/duration of menstrual bleeding with the severity of dysmenorrhea. One of the important findings of this study was the necessity of educating students about the methods of relieving menstrual pain. The majority of the students immediately used chemical drugs at the wrong time and without the physician's prescription. Considering the high prevalence of dysmenorrhea, raising awareness of female students about dysmenorrhea and its treatment is integral for promoting womens' health. This study did not investigate the correlation between the severity of primary dysmenorrhoea and life style and individual-social variables; thus, it is recommended that these factors be evaluated in future studies.

Acknowledgement

We would like to thank all of the students participated in this study.

Ethical Approval

The current research was approved scientifically by the research committee of Ahvaz University of Medical Sciences and ethically by the Ethic Committee of the university with the code of AJUMS.REC.1394.347 before recruitment of participants. Also, written informed consent was obtained from the participants.

Conflict of Interest: None declared.

References

1. Burnett M, Lemyre M. No. 345-Primary Dysmenorrhea Consensus Guideline. J Obstet Gynaecol Can. 2017;39(7):585–595. doi: 10.1016/j.jogc.2016.12.023. PubMed PMID: 28625286.
2. Dmitrovic R, Peter B, Cvitkovic-Kuzmic A, Strelec M, Kereshi T. Severity of symptoms in primary dysmenorrhea:a Doppler study. Eur J Obstet Gynecol Reprod Biol. 2003;107(2):191–4. doi: 10.1016/s0301-2115(02)00372-x. PubMed PMID: 12648867.
3. Osayande A.S, Mehulic S. Diagnosis and initial management of dysmenorrhea. Am Fam Physician. 2014;89(5):341–6. PubMed PMID: 24695505.
4. Shah M, Monga A, Patel S, Shah M, Bakshi H. A study of prevalence of primary dysmenorrhea in young students-A cross-sectional study. Healthline. 2013;4(2):30–4.
5. Hall JE. Menstrual disorders and pelvic pain. In Longo DL, Fauci AS, Kasper DL, editors. Harrison's Online. 18th ed. New York, NY: McGraw-Hill; 2012.
6. Harel Z. Dysmenorrhea in adolescents. Ann N Y Acad Sci. 2008;1135:185–195. doi: 10.1196/annals.1429.007. PubMed PMID: 18574224.
7. Fernández-Martínez E, Onieva-Zafra M.D, Parra-Fernández M.L. The Impact of Dysmenorrhea on Quality of Life Among Spanish Female University Students. Int J Environ Res Public Health. 2019;16(5):713. doi: 10.3390/ijerph16050713. PubMed PMID: 30818861; PubMed Central PMCID: PMC6427338.

8. O'Connell K, Davis AR, Westhoff C. Self-treatment patterns among adolescent girls with dysmenorrhea. J Pediatr Adolesc Gynecol. 2006;19(4):285-9. doi: 10.1016/j.jpag.2006.05.004. PubMed PMID: 16873033.
9. Hayes EC, Rock JA. COX-2 inhibitors and their role in gynecology. Obstet Gynecol Surv. 2002;57(11):768–80. doi: 10.1097/00006254-200211000-00023. PubMed PMID: 12447099.
10. Dell DL. Premenstrual syndrome, premenstrual dysphoric disorder, and premenstrual exacerbation of another disorder. Clin Obstet Gynecol. 2004;47(3):568–75. doi: 10.1097/01.grf.0000135298.39050.b3. PubMed PMID: 15326419.
11. Chan WY, Hill JC. Determination of menstrual prostaglandin levels in non-dysmenorrheic and dysmenorrheic subjects. Prostaglandins. 1978;15(2):365–75. doi: 10.1016/0090-6980(78)90176-4. PubMed PMID: 635225.
12. Chan WY, Dawood MY, Fuchs F. Relief of dysmenorrhea with the prostaglandin synthetase inhibitor ibuprofen: effect on prostaglandin levels in menstrual fluid. Am J Obstet Gynecol. 1979;135(1):102–8. PubMed PMID: 474640.
13. Dawood MY. Hormones, prostaglandin and dysmenorrhea. In Dawood MY, editor. Dysmenorrhea. Baltimore (MD): Williams and Wilkins; 1981. p. 20–52. doi: 10.2165/00003495-198122010-00003.
14. Fajrin I, Alam G, Usman A.N. Prostaglandin level of primary dysmenorrhea pain sufferers. Enferm Clin. 2020;30:5–9. doi: 10.1016/j.enfcli.2019.07.016.
15. Mohammad-Alizadeh Charandabi S, Mirghafourvand M, Nezamivand-Chegini S, Javadzadeh Y. Calcium with and Without Magnesium for Primary Dysmenorrhea: A Double-Blind Randomized Placebo Controlled Trial. IJWHR. 2017;5(4):332–338. doi: 10.15296/ijwhr.2017.56.
16. Mohammad-Alizadeh Charandabi S, Mirghafourvand M, Javadzadeh Y, Nezamivand-Chegini S. Effects of Calcium and its Combination with Magnesium on the Severity of Menstrual Symptoms in the Students with Dysmenorrhea. J of Guilan University of Med Sci. 2014;22(S1):83-92. Persian.
17. Mohammad Alizadeh Charandabi S, Mirghafourvand M, Javadzadeh Y, Nezamivand Chegini S. Effect of Calcium with and Without Magnesium on Amount and Duration of Menstrual Bleeding in Students with Primary Dysmenorrhea. IJOGI. 2014;16(83):1-8. doi: 10.22038/IJOGI.2014.2263.
18. Reid PC, Coker A, Coltart R. Assessment of menstrual blood loss using a pictorial chart: a validation study. BJOG. 2000;107(3):320-2. doi: 10.1111/j.1471-0528.2000.tb13225.x. PubMed PMID: 10740326.
19. Chan WY, Dawood MY, Fuchs F. Prostaglandins in primary dysmenorrhea. Comparison of prophylactic and nonprophylactic treatment with ibuprofen and use of oral contraceptives. Am J Med. 1981;70(3):535–41. doi: 10.1016/0002-9343(81)90576-3. PubMed PMID: 7011011.
20. Iacovides S, Avidon I, Baker FC. What we know about primary dysmenorrhea today: A critical review. Hum Reprod Update. 2015;21(6):762–78. doi: 10.1093/humupd/dmv039. PubMed PMID: 26346058.
21. Lefebvre G, Pinsonneault O, Antao V, Black A, Burnett M, Feldman K, et al. Primary dysmenorrhea consensus guideline. J Obstet Gynaecol Can. 2005;27(12):1117-46. doi: 10.1016/s1701-2163(16)30395-4. PubMed PMID: 16524531.
22. Eryilmaz G, Ozdemir F, Pasinlioglu T. Dysmenorrhea prevalence among adolescents in eastern Turkey: its effects on school performance and relationships with family and friends. J Pediatr Adolesc Gynecol. 2010;23(5):267-72. doi: 10.1016/j.jpag.2010.02.009. PubMed PMID: 20493741.
23. Dambhare DG, Wagh SV, Dudhe JY. Age at menarche and menstrual cycle pattern among school adolescent girls in Central India. Glob J Health Sci. 2012;4(1):105-11. doi: 10.5539/gjhs.v4n1p105. PubMed PMID: 22980118; PubMed Central PMCID: PMC4777020.
24. Campbell MA, McGrath PJ. Use of medication by adolescents for the management of menstrual discomfort. Arch Pediatr Adolesc Med. 1997;151(9):905-13. doi: 10.1001/archpedi.1997.02170460043007. PubMed PMID: 9308868.
25. Armour M, Parry K, Al-Dabbas MA, Curry C, Holmes K, MacMillan F, et al. Self-care strategies and sources of knowledge on menstruation in 12,526 young women with dysmenorrhea: A systematic review and meta-analysis. PLoS One. 2019;14(7):e0220103. doi: 10.1371/journal.pone.0220103. PubMed

PMID: 31339951; PubMed Central PMCID: PMC6655766.
26. Vicdan K, Kukner S, Dabakoglu, Ergin T, Keles G, Gokmen O. Demographic and epidemiologic features of female adolescents in Turkey. J Adolesc Health. 1996;18(1):54-8. doi: 10.1016/1054-139x(95)00127-e. PubMed PMID: 8750429.
27. Demir SC, Kadayýfçý TO, Vardar MA, Atay Y. Dysfunctional uterine bleeding and other menstrual problems of secondary school students in Adana, Turkey. J Pediatr Adolesc Gynecol. 2000;13(4):171-5. doi: 10.1016/s1083-3188(00)00061-9. PubMed PMID: 11173019.
28. Ersoy B, Balkan C, Gunay T, Onag A, Egemen A. Effects of different socioeconomic conditions on menarche in Turkish female students. Early Hum Dev. 2004;76(2):115–25. doi: 10.1016/j.earlhumdev.2003.11.001. PubMed PMID: 14757263.
29. De Sanctis V, Soliman A.T, Elsedfy H, Soliman N.A, Elalaily R, El Kholy M. Dysmenorrhea in adolescents and young adults: A review in different country. Acta Biomed. 2016;87(3):233–246. PubMed PMID: 28112688.
30. 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. PubMed PMID: 19585756.
31. Kural M, Nagori Noor N, Pandit D, Joshi T, Patil A. Menstrual characteristics and prevalence of dysmenorrhea in college going girls. J Family Med Prim Care. 2015;4(3):426–31. doi: 10.4103/2249-4863.161345. PubMed PMID: 26288786; PubMed Central PMCID: PMC4535108.
32. Akhavanakbari P, Ahangar Davoudi SH. Dysmenorrhea Frequency and Severity and Its Related Factors in Students of Ardabil University of Medical Science in 1388. Journal of Health. 2011;1(3):41-47. Persian.