

Dysmenorrhea and its impact on daily activities among secondary school students in Basra, Iraq

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Summary:

Background: Most adolescent girls experience some degree of dysmenorrhea, which can impact on their daily activities. It is responsible for school absenteeism or interruption of social activities. Therefore, investigating dysmenorrhea among secondary school students is important to provide caregivers with data necessary for interventions

Objectives: This study was conducted to estimate the prevalence of dysmenorrhea among secondary school students in Basra, Iraq and to study its impact on their daily activities.

Materials & methods: A cross sectional study was conducted from Jan. 2011 to May 2011 among 350 secondary school students using a semi-structured questionnaire.

Results: Out of 350 participants (aged 15-20 years), 313(89.4%) had dysmenorrhea. Dysmenorrhea was mild in 12.8% of students, moderate in 54.3% and severe in 32.9%. Menstrual irregularity, and a family history of dysmenorrhea were important risk factors for dysmenorrhea ($p < 0.05$). Of dysmenorrheic students, 79.9% reported that it limited their daily activities. Activities affected by dysmenorrhea included; class concentration (53.4%), homework (48.6%), school attendance (33.9%), socialization (24.3%). The most common associated symptoms were fatigue (55.9%), mood change (37.4%), dizziness (35.5%) and loss of appetite (34.8%). Of those who experienced dysmenorrhea, 13.7% consulted a physician, and 56.3% practiced self-medication.

Conclusions: The prevalence of dysmenorrhea among secondary school students in Basra was high, and it may be severe enough to affect their daily activities. It is necessary to improve the therapeutic options to relieve pain and to reduce the impact of dysmenorrhea on social and school activities.

Key words: Adolescents, Basra, daily activities, dysmenorrhea, prevalence, school absenteeism, students.

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Introduction:

Dysmenorrhea is a common problem in women of reproductive age, and it is highly prevalent during adolescence. There is a wide variation in the estimate of dysmenorrhea from studies around the world reporting a range between 20% and 90% [1,2]. In Iraq, a study among university students showed that the prevalence of dysmenorrhea was 85.4% [3].

Dysmenorrhea may be categorized into two distinct types: primary and secondary. Primary dysmenorrhea is defined as painful menses in women with normal pelvic anatomy, usually beginning during adolescence [4]. Secondary dysmenorrhea is menstrual pain associated with underlying pathology, and its onset may be years after menarche. It can be caused by many disorders such as endometriosis, pelvic inflammatory disease, intra-uterine devices, irregular cycles or infertility problems, ovarian cysts, adenomyosis, uterine myomas or polyps, intra-uterine adhesions, or cervical stenosis [5].

Dysmenorrhea is characterized by crampy pelvic pain beginning shortly before or at the onset of menses and lasting 1-3 days [6]. Some 2--4 days before menstruation

begins, prostaglandins proceed into the uterine muscle where they build up quickly at menstrual onset and act as smooth muscle contractors that aid in the expulsion of the endometrium [7].

Studies in different cultures have associated it with one of the most common causes of regular absenteeism among young women in schools, work places, sports participation, and other social activities [8-10]. The risk factors for dysmenorrhea were; age <20 years, nulliparity, prolonged or heavy menstrual flow, smoking, high/upper socioeconomic status, attempts to lose weight, low body mass index, early menarche, psychological disturbance and anxiety [11-12]. The incidence and prevalence of dysmenorrhea are not established in Basra. The study of dysmenorrhea and its associated risk factors and impact on daily activities would highlight the severity of the problem.

Subjects and methods

Study design

This was a descriptive cross-sectional study conducted in Basra city, Iraq between January and May 2011. The study protocol was approved by the ethical committee of College

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of Medicine, Basra University.

Sampling and sample size: The target population was female secondary-school students enrolled in government schools. Approval of the local directorate of education was obtained. A multistage sampling method was applied. In the first stage, a list of the female secondary schools was obtained from Basra Education Directorate. Four schools were selected randomly. In the second stage, within the selected schools, grade 10th to 12th students who had already have menstruation were recruited.

Sample size: The sample size was calculated assuming 95% confidence level, 50% high risk prevalence (for the sake of having larger sample size it was considered taking 50% as appropriate) and a degree of precision of 0.05 [13]. A sample size of 384 students was decided upon. The sample size was distributed proportionally between the selected schools to account for the 384 sample size. Of the 384 students, 34 were excluded from the study due to unwillingness to participate in the study (5 students), or due to absence from the school at the time of the study (29 students). The remaining 350 students (91.1%) students constituted the study population.

Data collection: The data were collected through a self-administered semi-structured questionnaire, prepared with reference to previous studies in the literature [4,8,14]. Its validity was reviewed by selected health care experts and professionals and tested on a sample of the target population. It covers socio-demographic characteristics and questions related to menstruation including age at menarche, duration and amount of flow, regularity of cycle, pain during menstruation (dysmenorrhea) during the previous 3 months, severity of the pain, duration of pain, any associated symptoms, impact on daily activities (self-perceived impact on class concentration, school attendance, social relationship, homework tasks) and treatment taken, if any.

If the student had pain in the abdomen, groin, and lumbar region on the day before the menstrual period and/or the first day of menstrual period, it was considered to be dysmenorrhea [14]. The Visual Analogue Scale (VAS) was used to assess the severity of dysmenorrhea [15].

The Visual Analogue Scale (VAS) using a 10 cm line represented the continuum of the student's opinion of the degree of pain. One extremity of the line represented "no pain at all" and the other extremity represented "unbearable pain". This scale has well-established validity and reliability [16]. The participants were asked to rate the degree of pain by making a mark on the line. The scores received from the scale were classified into mild dysmenorrhea if it was between 1-3 points, moderate between 4-7 points and severe between 8-10 points [5,15]. School absence was defined as

missing a half day to complete day of school because of pain during menstruation [8]. The presence of dysmenorrhea in student's mother or sister was accepted as positive family history of dysmenorrhea. The students were briefed about the study, encouraged to participate and motivated to express their experiences. An informed consent was obtained from all participants. It was emphasized that participation in the study was voluntarily and all data collected were strictly confidential and would not be used for anything except for this study. All students surveyed at school during a class period. They were informed of how the questionnaires were to be filled in and then were requested to make a choice applicable to themselves. The students completed questionnaires in the presence of one of the researchers. Regular menstruation was defined as a cycle repeated once every 28-32 days with duration 5-7 days [17].

The quantity of menstrual flow usually experienced was recorded by each participant based on the number of pads used per day during the menstruation. The extent of blood loss was expressed as little (< 4 pads/day, moderate 5- 10 pads/day, and heavy (2 pads at a time) [18].

Data analysis: The data were analyzed using Statistical Package for Social Sciences (SPSS) version 17. Descriptive statistics were used to determine mean age of participants, age at menarche, prevalence, treatment of dysmenorrhea and activities affected by this condition. The categorical data were analyzed by Chi-square or Fisher's exact test. The continuous data were analyzed using t-test or one-way analysis of variance (ANOVA) as appropriate. Associations between the level of menstrual pain and activities affected by menstrual pain (school absence, homework, class concentration, social relations, and going out with friends) were analyzed using odds ratios with 95% confidence intervals. A logistic regression analysis was used to identify the variables that were independently associated with dysmenorrhea. The level of significance was determined at $p < 0.05$.

Results:

The mean age of the participants was 17.15(\pm 1.11) years (range 15-20 years). The mean age at menarche was 12.72 (\pm 1.19) years and the mean duration of menstruation was 5.57(\pm 1.26) days with 73.1% of them having regular cycles. All the participants were unmarried.

The prevalence of dysmenorrhea in the last 3 months to the study was 89.4% (95% confidence interval [CI] 86.3 - 92.6%). Most of them experienced moderate and severe dysmenorrhea, that were 170 (54.3%) and 103 (32.9%) respectively. Only 40 (12.8%) had mild dysmenorrhea. (Figure 1)

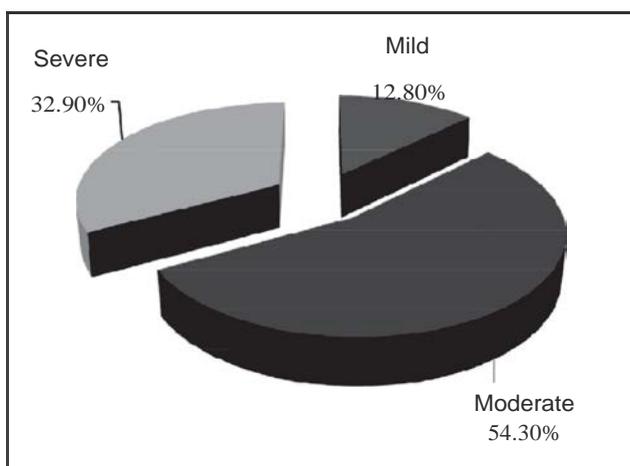


Figure 1 Severity of dysmenorrhea

Beside dysmenorrhea, 84% of the students (95% CI 80.2 - 87.8%) reported other menstruation-related symptoms. Among participants with dysmenorrhea, 55.9% reported tiredness, 37.4% mood change, 35.5% dizziness, 34.8% loss of appetite, 24.3% headache, 20.4% abdominal bloating sensation, 11.2% nausea, 9.3% back pain, and 8.3% diarrhea. (Table 1)

Table 1 Other symptoms associated with dysmenorrhea

| Symptom | No. | % |
|------------------------------|-----|-------|
| Tiredness (fatigue) | 175 | 55.9% |
| Mood change | 117 | 37.4% |
| Dizziness | 111 | 35.5% |
| Loss of appetite | 109 | 34.8% |
| Headache | 76 | 24.3% |
| Abdominal bloating sensation | 64 | 20.4% |
| Nausea | 35 | 11.2% |
| Back pain | 29 | 9.3% |
| Diarrhea | 26 | 8.3% |

Dysmenorrhea was shown to be significantly higher in students with irregular menstrual cycle ($X^2 = 5.423$; $P = 0.012$) and positive family history of dysmenorrhea ($X^2 = 17.171$, $P < 0.001$). However, this study found no significant association of dysmenorrhea with the age of the students ($P = 0.585$), age of menarche ($P = 0.443$), duration of menstruation ($P = 0.269$), interval of menses ($P = 0.268$) and bleeding amount ($P = 0.191$) (Table 2).

Table 2 Association of dysmenorrhea with socio-demographic and menstrual characteristics (N=350)

| Variables | Dysmenorrhea (n=313) | No-dysmenorrhea (n=37) | Total (n=350) | Significance test; P-value |
|---------------------------|----------------------|------------------------|---------------|----------------------------|
| Family history | | | | |
| Negative | 96 (80%) | 24 (20%) | 120 (34.3%) | $X^2 = 17.171$; 0.000 |
| Positive | 217 (94.3%) | 13 (5.7%) | 230 (65.7%) | |
| Family income | | | | |
| Low | 6 (75%) | 2 (25%) | 8 (2.3%) | FET=2.163; 0.322 |
| Intermediate | 130 (90.3) | 14 (9.7%) | 144 (41.1%) | |
| High | 177 (89.4) | 21 (10.6%) | 198 (56.6%) | |
| Menses regularity | | | | |
| Regular | 223 (87.1%) | 33 (12.9%) | 256 (73.1%) | $X^2 = 5.423$; 0.012 |
| Irregular | 90 (95.7%) | 4 (4.3%) | 94 (28.9%) | |
| Amount of blood (pad/day) | | | | |
| Little (<4) | 13 (86.7%) | 2 (13.3) | 15 (4.3%) | FET=2.915; 0.191 |
| Moderate (5-10) | 278 (88.9%) | 35 (11.2%) | 313 (89.4%) | |
| Heavy (2 pads at a time) | 22 (10%) | 0 (0%) | 22 (6.3%) | |
| | Mean± SD | Mean±SD | Mean± SD | |
| Age (years) | 17.16 ± 1.13 | 17.01 ± 0.88 | 17.15 ± 1.11 | t-test= -0.547 ;0.585 |
| Age at menarche (years) | 12.71 ± 1.17 | 12.86 ± 1.38 | 12.72 ± 1.19 | t-test= 0.767; 0.443 |
| Interval of menses | 28.8 ± 2.9 | 28.2 ± 3.2 | 28.7 ± 2.9 | t-test= -1.110; 0.268 |
| Duration of menses (days) | 5.59 ± 1.23 | 5.35 ± 1.16 | 5.57 ± 1.26 | t-test= -1.107; 0.269 |

FET Fisher's Exact Test

On logistic regression analysis, the significant determinants of dysmenorrhea were cycle irregularity and family history of dysmenorrhea (Table 3).

Table 3 Logistic regression analysis of factors affecting dysmenorrhea

| Variable | B | P-value | Expected (B) | 95% CI of expected (B) | |
|-------------------|-------|---------|--------------|------------------------|-------|
| | | | | Lower | Upper |
| Menses regularity | 1.151 | 0.037 | 3.162 | 1.074 | 9.313 |
| Family history | 1.402 | 0.000 | 4.065 | 1.975 | 8.364 |

Overall, 79.9% (95% CI 75.4%- 85%) of the dysmenorrheic

students reported reduced daily activities because of dysmenorrhea. Low class concentration, school absenteeism, limitation of social activities, and reduced home tasks were significantly affected. Of dysmenorrheic students, 53.4% reported that their class concentration was affected, and 33.9% reported absence from school. Negative effects on home tasks reported by 48.6%. Most of the students for whom dysmenorrhea affected their activities were in the moderate and severe groups (Table 4).

Table 4 Impact of dysmenorrhea on daily activities

| Activity | Mild pain* (n=40) | Moderate Pain (n =170) | Severe Pain (n = 103) | | p-value | |
|-----------------------|-------------------|------------------------|-----------------------|------------|--------------------|-------|
| | No.(%) | No.(%) | OR(95% CI) | No.(%) | | |
| Class concentration | 18 (45%) | 80 (47.1%) | 1.09 (0.54 - 2.17) | 69 (67%) | 2.48 (1.18- 5.23) | 0.003 |
| School absence | 4 (10%) | 44 (25.9%) | 3.14 (1.06- 9.33) | 58 (56.3%) | 11.6(3.85- 34.99) | 0.000 |
| Social activities | 4 (10%) | 40 (23.5%) | 2.77 (0.93- 8.26) | 32(31.1%) | 4.06 (1.33- 12.36) | 0.029 |
| Homework tasks | 13(32.5%) | 77 (45.3%) | 1.72 (0.83- 3.55) | 62 (60.2%) | 3.14 (1.45- 6.79) | 0.005 |
| Relation with friends | 6 (15%) | 28 (16.5%) | 1.12 (0.43- 2.91) | 28 (27.2%) | 2.12 (0.78- 6.59) | 0.071 |

* Reference group

OR Odds ratio

CI Confidence interval

Table 5 showed the management strategies for dysmenorrhea. Approximately 57% of the students with dysmenorrhea had to take a rest, 23.6% used oral analgesics for pain relief, 18.5% used herbal remedies and 7.3% used hot pads. Self-medication was reported by 56.3% while only 13.7% consulted a physician.

Table 5 Management strategies for dysmenorrhea

| Type of treatment | No. | o;o |
|-------------------|-----|------|
| Rest | 178 | 56.9 |
| Analgesics | 74 | 23.6 |
| Herbal remedies | 58 | 18.5 |
| Hot pads | 23 | 7.3 |

Discussion:

The prevalence of dysmenorrhea in this study was 89.4%. This is comparable to previously reported prevalence in both developed and developing countries for the same age group. In Hispanic American adolescents (85%) [8], Switzerland (86.6%) [19], Thailand (84.9%) [20], Korea (82%) [21], and Nigeria (83.7%) [22]. However, it was slightly lower than that reported in some Arab countries. In Oman, it was 94% [23], Egypt (Al-Minia) 94.4% [24]. On the other hand, it was higher than that reported in Iran 71.2% [25], Ethiopia (72%) [26], Ghana (74.4%)[27], and Malaysia (74.5%) [28]. The variation in these estimates may be attributed to differences in the methods of collecting data, ethnic proportions, cultural background, geographical location and most importantly is the absence of a universally

accepted method of defining dysmenorrhea [8,20,29]. Pain associated with dysmenorrhea is difficult to measure partly because it is usually accompanied by other unpleasant sensations and partly because the reactive accompaniments affect the judgment of pain [25,29].

The severity of dysmenorrhea varied greatly. In our study 32.9% of the participants with dysmenorrhea reported their pain as severe. In other studies, severe dysmenorrhea was reported by 15%-53% of adolescents [9]. These differences in pain severity may be related to ethnic and cultural differences in pain perception and variability in pain threshold [8,9]. The most commonly associated effects of dysmenorrhea were tiredness (fatigue), anxiety and dizziness. This result was similar to findings of other studies [8,9,20,29]. Family history was significantly associated with dysmenorrhea. A finding which is consistent with that of others [5]. This could be partly due to genetic factor that may be involved in the pathogenesis of primary dysmenorrhea [30] or it may be related to behavior that is learned from the mother [31]. Daughters may react to menstruation similarly like their mothers and they may share the same attitude and taboos towards menses [32]. The prevalence of dysmenorrhea was higher in students with menstrual irregularity (P=0.012, OR=3.162), in agreement with other findings [23,33].

We did not find an association between amount of menstrual bleeding and length of flow with dysmenorrhea. Other studies too did not find any association of amount of blood and length of menstrual flow with dysmenorrhea [29,30]. This study showed no significant association between the

prevalence of dysmenorrhea and the mean age of menarche in agreement with other studies [1,33]. Even though other studies had found a significant association with the age of menarche [34,35]. Although not life threatening, dysmenorrhea can be particularly disruptive to a woman's daily life and productivity. In the absence of appropriate pain relief, women with severe dysmenorrhea may not be able to carry out their normal activities [10,36].

In our study, 79.9% of students with dysmenorrhea reported limitation of daily activities. Activities most commonly limited due to dysmenorrhea were concentration in class, homework tasks, attending school and participation in social events. All the limitations were significantly more frequent among students with severe dysmenorrhea as compared to those with mild or moderate pain in agreement with other studies [8,37]. Our study showed that the prevalence of poor classroom concentration was the major impact of dysmenorrhea. It was reported by 53.4% of dysmenorrheic students. It ranged from 45% in those with mild dysmenorrhea to 67% in severe dysmenorrhea with a highly significant difference [$P < 0.01$ and OR 2.48 (95% CI 1.18 – 5.23)]. These findings were similar to those of the other studies [28,38,39]. School absenteeism due to dysmenorrhea was 33.9% among dysmenorrheic subjects ranging from 10% in the mild group to 56.3% in the severe group which was consistent with previous studies [8,32,38]. Despite the high prevalence of dysmenorrhea among the participants, many girls either did not seek medical advice or used non pharmacologic methods such as rest, hot pads or herbal remedies to treat dysmenorrhea. Of those who experienced dysmenorrhea, only 13.7% consulted a physician, and 56.3% practiced self-medication. This suboptimal use of the health care system or low consultation rate by adolescents has also been reported elsewhere [38]. This may be attributed to socio-cultural factors. Cultural background and the fact that most women regard menstruation as a normal part of their female constitution and a private and embarrassing issue to be discussed publicly may attribute to such a suboptimal use of the health care system [8,25]. There are some limitations to this study. Secondary dysmenorrhea is rare among adolescents but this cause of menstrual pain could not be excluded because the participants were not clinically examined. Also, the participants were asked to recall menstrual and daily activities information for three months ago, which may have led to recall bias. In addition, the information on dysmenorrhea was obtained by self-report and could not be validated. This study was performed in only four secondary schools, therefore the data may reasonably be expected to apply to most but perhaps not all adolescent students. The last limitation is that this study was a cross-sectional study, thus precluding inferences of causality among variables.

Conclusions:

The prevalence of dysmenorrhea was high among secondary school students in Basra, Iraq. It was significantly more among students with irregular menstrual cycles and positive family history. A number of physical and emotional symptoms were associated with dysmenorrhea. Students with more severe dysmenorrheic pain had significant effects on their daily activities. School health authorities and primary health care providers should be aware to identify this health problem and to manage appropriately.

Authorship contributions:

Jasim Naeem Al-Asadi: Contribution: Proposing the idea of the study topic, design, data analysis, drafting and approval of the final draft.

Rasha Ahmed Abdul-Qadir: Contribution: Data collection

References

1. 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;27:765-770.
2. Pitts MK, Ferris JA, Smith AM, Shelley JM, Richters J. Prevalence and correlates of three types of pelvic pain in a nationally representative sample of Australian women. *Med J Aust.* 2008;189:138-143.
3. Tawfeek RS. Impact of dysmenorrhea among sample of female students in Tikrit University at 2008. *Tikrit Medical Journal* 2008; 14(2):127- 130.
4. Avasarala AK, Panchangam S. Dysmenorrhea in different settings: Are the rural and urban adolescent girls perceiving and managing the dysmenorrhea problem differently? *Indian J Community Med.* 2008; 33: 246-249.
5. 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. *Upsala Journal of Medical Sciences.* 2010; 115:138-145.
6. Adeyemi AS, Adekanle DA. Management of dysmenorrhea among medical students. *Int J Gynecol Obstet.* 2007;7:1528-1539.
7. Campbell M, McGrath P. Use of medication by adolescents for the management of menstrual discomfort. *Arch Pediatr Adolesc Med.* 1997;151:905-912.
8. Banikarim C, Chacko MR, Kelder SH. Prevalence and impact of dysmenorrhoea on Hispanic female Adolescent. *Arch Pediatr Adolesc Med* 2000; 154: 1226-1229.
9. El-Gilany, A.H., Badawi, K. & El-Fedawy, S. Epidemiology of dysmenorrhea among adolescent students in Mansoura, Egypt. *Eastern Mediterranean Health Journal* 2005;11: 155-163.
10. Walraven G, Ekpo G, Coleman R, Scherf C, Morison L, Harlow SD. Menstrual disorders in rural Gambia. *Studies in Family Planning* 2002;33: 261-268.

11. Harlow SD, Park M: A longitudinal study of risk factors for the occurrence, duration and severity of menstrual cramps in a cohort of college women. *Br. J Obstet Gynaecol* 1996; 103: 1134-1142.
12. Latthe P, Mignini L, Gray R, Hills R, Khan K. Factors predisposing women to chronic pelvic pain: systematic review. *BMJ* 2006; 332: 749-755.
13. Naing L, Winn T, Rusli BN. Practical Issues in Calculating the Sample Size for Prevalence Studies. *Archives of Oral Facial Sciences* 2006; 1: 9-14.
14. Patel V, Tanksale V, Sahasrabhojane M, Gupte S, Nevrekar P. The burden and determinants of dysmenorrhea: a population-based survey of 2262 women in Goa, India. *BJOG* 2006; 113: 453-463.
15. Larroy C. Comparing visual-analog and numeric scales for assessing menstrual pain. *Behav Med.* 2002; 27(4): 179-181.
16. McDowell L, Newell C. *Measuring Health: A Guide to Rating Scales and Questionnaires.* 2nd ed. New York, NY Oxford University Press; 1996.
17. Karout N, Hawaii SM, Altuwaijri S. Prevalence and pattern of menstrual disorders among Lebanese nursing students. *EMHJ* 2012; 18(4): 346-352.
18. Higham JM, O'Brien PM, Shaw RW. Assessment of menstrual blood loss using a pictorial chart. *Br J Obstet Gynaecol* 1990; 97(8): 734-739.
19. Narring F, Yaron M, Ambresin AE. Dysmenorrhea: a problem for the pediatrician. *Arch Pediatr.* 2012; 19(2): 125-130.
20. Chongpensuklert Y, Kaewrudee S, Soontrapa S, Sakondhavut C. Dysmenorrhea in Thai Secondary School Students in Khan Kaen, Thailand. *Thai J Obstet Gynaecol* 2008; 16(1): 47-53.
21. Lee JC, Yu BK, Byeon JH, Lee KH, Min JH, Park SH. A study on the menstruation of Korean adolescent girls in Seoul. *Korean J Pediatr.* 2011; 54(5): 201-206.
22. Adetokunbo OT, Oluwarotimi A, Lukeman AJS, Osinusi BO. Appraisal of menstrual awareness and pattern among female secondary school students in Lagos. *Sci. Res. Essays* 2009; 4(11): 1271-1274.
23. Al-Kindi R, Al-Bulushi A. Prevalence and Impact of Dysmenorrhea among Omani High School Students. *SQU Med J* 2011; 4(11): 485-491.
24. Abd El-Hameed NA, Mohamed MS, Ahmed NH, Ahmed ER. Assessment of Dysmenorrhea and Menstrual Hygiene Practices among Adolescent Girls in Some Nursing Schools at EL-Minia Governorate, Egypt. *Journal of American Science* 2011; 7(9): 216-223.
25. Rostami M. The study of dysmenorrhea in high school girls. *Pak J Med Sci* 2007; 23(6): 928-931.
26. Zegeye DT, Megabiaw B, Mulu A. Age at menarche and the menstrual pattern of secondary school adolescents in northwest Ethiopia. *BMC Women's Health* 2009; 9: 29-36.
27. Gumanga SK, Kwame-Aryee RA. Menstrual characteristics in some adolescent girls in Accra, Ghana. *Ghana Med J* 2012; 46(1): 3-7.
28. Wong LP, Khoo EM. Dysmenorrhea in a multiethnic population of adolescent Asian girls. *Int J Gynaecol Obstet.* 2010; 108(2): 139-142.
29. Tangchai K, Titapant V, Boriboonhirunsarn D. Dysmenorrhea in Thai Adolescents: Prevalence, Impact and Knowledge of Treatment. *J Med Assoc Thai* 2004; 87(Suppl 3): S69-S73.
30. Parveen N, Majeed R, Rajar UDM. Familial predisposition of dysmenorrhea among the medical students. *Pak J Med Sci* 2009; 25(5): 857-860.
31. Darn LD, Negriff S, Huang B, Pabst S, Hillman J, Braverman P, et al. Menstrual symptoms in adolescent girls: association with smoking, depressive symptoms, and anxiety. *J Adolesc Health* 2009; 44: 237-243.
32. Liliwati I, Verna LKM, Khairani O. Dysmenorrhea and its Effects on School Activities Among Adolescent Girls in a Rural School in Selangor, Malaysia. *Med & Health* 2007; 2(1): 42-47.
33. Unsal A, Tozun M, Asian G, Ayranci U, Alkan G. Evaluation of dysmenorrhea among women and its impact on quality of life in a region of Western Turkey. *Pak J Med Sci* 2010; 26(1): 142-147.
34. Charu S, Amita R, Sujoy R, George Aneesh Thomas GA. Menstrual characteristics and Prevalence and Effect of Dysmenorrhea on Quality of Life of medical students. *International Journal of Collaborative Research on Internal Medicine & Public Health* 2012; 4(4): 276-294.
35. Cakir M, Mungan L, Karakas T, Giriskan I, Okten A. Menstrual pattern and common menstrual disorders among university students in Turkey. *Pediatr Int* 2007; 49(6): 938-942.
36. Harlow SD, Campbell OMR. Menstrual dysfunction: a missed opportunity for improving reproductive health in developing countries. *Reproductive health matters.* 2000; 8(15): 142-147.
37. Ramamchandran C. Prevalence of Premenstrual Syndrome and Dysmenorrhoea among Female Medical Students and its Association with College Absenteeism. *Int J Biol Med Res.* 2011; 2(4): 1011-1016.
38. Mohamed EM. Epidemiology of Dysmenorrhea among Adolescent Students in Assiut City, Egypt. *Life Science Journal* 2012; 9(1): 348-353.
39. Hillen TL, Grbavac SL, Johnston PJ, Straton JA, Keogh JM. Primary dysmenorrhea in young Western Australian women: prevalence, impact, and knowledge of treatment. *J Adolesc Health* 1999; 25: 40-45.