

# Dysmenorrhea and Its Effects on School Absenteeism and School Activities among Adolescents in Selected Secondary Schools in Ibadan, Nigeria

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## Abstract

**Background:** Menstruation can be associated with dysmenorrhea that may affect daily activities. This study aimed to determine the prevalence of dysmenorrhea, effects on school activities, and associated school absenteeism among secondary school girls in Ibadan, Nigeria. **Materials and Methods:** This cross-sectional study was among 460 students from all girls' only secondary schools in Ibadan, Nigeria, using a cluster sampling method. Data were collected using questionnaires and focus group discussions. The severity of dysmenorrhea was categorized as mild, moderate, and severe. Data collected were analyzed using descriptive statistics and Chi-square tests performed to determine significant associations. Level of statistical significance was set at 5%. **Results:** Prevalence of dysmenorrhea and school absenteeism was 73% and 13.1%, with the severity of dysmenorrhea being 37.5%, 43.8%, and 18.8% for mild, moderate, and severe dysmenorrhea. Other school activities affected were as follows: class concentration, class participation, social, and sports activities (17.6%, 12.2%, 10.9%, and 4.6%). Main sources of medication for pain relief were family (15.8%) and self (13.7%). Age and duration of menstruation predicted dysmenorrhea (odds ratio [OR]=3.5, confidence interval [CI]= 1.2–9.7,  $P = 0.019$ ), (OR = 1.7, CI = 1.1–2.6,  $P = 0.022$ ), whereas severe dysmenorrhea predicted school absenteeism (OR = 4.2, CI = 1.7–9.9,  $P = 0.001$ ). Respondents opined that analgesic drugs should be available in school to prevent school absenteeism. **Conclusion:** Prevalence of dysmenorrhea was high and severe dysmenorrhea played a role in school absenteeism. Health education should be provided to address the dangers of self-medication while drugs for pain relief should be available in schools.

**Keywords:** Adolescents, dysmenorrhea, menstruation, school absenteeism

## INTRODUCTION

An adolescent is a young person from the age of 10–19 years and the period of adolescence signifies the transition from childhood to adulthood. During adolescence, girls attain menarche (the commencement of menstruation) which represents a landmark event in pubertal development in the adolescent girl.<sup>1</sup> Menstruation in young girls may be characterized with variability in volume and pattern as well as associated pain and discomfort which is known as dysmenorrhea. Dysmenorrhea refers to painful menstruation and is the most common gynecological condition experienced by women causing pain in the lower abdomen, extending to the lower back or legs.<sup>1,2</sup> While some women in their reproductive history have never experienced menstrual discomfort, approximately half of menstruating young women go through

painful menstruation regularly.<sup>2</sup> Dysmenorrhea has been identified as the most common menstruation-related cause of short-term school absenteeism among young girls. Recurrent school absenteeism has negative impacts on adolescent girls by reducing contact time for their learning which may have implications on the quality of education they receive and this has been reported to be of national and economic value.<sup>3</sup>

Dysmenorrhea has, therefore, been identified as a public health problem because of its high prevalence, the degree

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of discomfort felt by the sufferer as well as the reduction in the quality of life of female students.<sup>4,5</sup> The prevalence of dysmenorrhea among girls was documented to be as high as 85.4% in one study, and this was linked with poor school attendance.<sup>3</sup> Secondary school education has been considered as the foundation for higher academic learning and the cornerstone of the educational system in the 21<sup>st</sup> century. It is the gateway to the opportunities and benefits of economic and social development and also a vital step in an educational journey. Recurrent absenteeism at this period can lead to academic underachievement and is likely to affect future job prospects.<sup>6</sup>

Most young girls do not seek medical help as they seem to accept the discomfort as part of the physiological process of the transition between adolescence and adulthood, and as something that cannot be ameliorated.<sup>7</sup> This study was, therefore, aimed to determine the prevalence of dysmenorrhea and absenteeism among female students in Ibadan, with a view to determine its severity as well as preventive measures adopted by the girls. Research findings will provide information on opportunities for interventions that will enlighten girls on what they can do to reduce the severity of pain experienced and therefore reduce school absenteeism.

## MATERIALS AND METHODS

Ibadan is a city in Southwestern Nigeria with a total area of 1190 m<sup>2</sup>. It is the capital city of Oyo State and the third largest metropolitan area, by population, in Nigeria, after Lagos and Kano, with a population of 5,580,894 according to the 2006 census.<sup>8</sup>

This cross-sectional descriptive study involved adolescent females (aged 10–19) in all the 14 public girls' only senior secondary (SS) schools in the five urban local governments in Ibadan (Ibadan North, Ibadan South West, Ibadan South East, Ibadan North East, and Ibadan North West local government areas) employing a one-stage cluster sampling technique (with the local governments representing the single stage at which selection took place). A minimum sample size of 305 was determined using the Leslie Kish formula for cross-sectional study designs.<sup>9</sup> A sample size of 460 was utilized after adjusting for design effect. All students aged 10–19 who had started menstruating in the selected schools were eligible to participate in the study. An arm of each class (SS1 to SS3) was selected by balloting and information was obtained from all the students that were eligible for the study in that arm and were willing to participate. A pretested interviewer administered semi-structured questionnaire was used to obtain information on sociodemographic characteristics, menstrual characteristics and pattern, the severity of dysmenorrhea, absenteeism, preventive methods/treatment used as well as dysmenorrhea, and exercise. The instruments were administered during their free period with the help of two research assistants who had been adequately trained on the content of the instrument before the commencement of the survey.

To assess the severity of the dysmenorrhea, the respondents were asked to rate their pain from a scale of 1–10 and to analyze this, itemized scores were categorized using a multi-dimensional scoring system into three grades (mild, moderate, and severe). Grade 1 (mild) represented scores 1–3, Grade 2 (moderate) stood for scores 4–7, and Grade 3 (severe) represented scores 8–10. Mild pain was defined as painful menstruation that seldom inhibits daily activity and analgesics are seldom required; moderate pain as painful menstruation that affects daily activities and analgesics are required and give relief while severe pain as painful menstruation that clearly inhibits daily activities with the pain not being totally relieved by analgesics. Each participant was interviewed privately by female research assistants.

Five focus group discussions (FGDs) were also carried out in five schools, with one school being selected by simple random sampling from each of the five urban local governments in Ibadan where the study was conducted. A total of 8 students participated in each FGD session. The FGD sessions were conducted to provide greater context with respect to the experience of dysmenorrhea among the respondents.

Ethical clearance was obtained from the Oyo State Ethical Review Board. Each participant was provided with information on the study and its objectives and informed that participation was voluntary. Consent was obtained from the respondents who were 18 years and above by signing an informed consent form while assent, as well as parental consent, was taken for those <18 years. This was done through the use of assent forms and parent consent forms as appropriate. Approval was obtained from the State Ministry of Education as well as from the principals of each school. Confidentiality of the information given was guaranteed since the instrument did not bear the name of the respondents. All questionnaires were tagged with only serial numbers and they were kept secured at all times.

The data were analyzed using the Statistical Package for Social Science, (Version 2.0, SPSS Inc., Chicago, USA). Frequency tables were generated, and the Chi-square test was used to test for association between categorical variables. A value of  $P < 0.05$  was considered as statistically significant. Logistic regression analysis was performed to determine the predictors of dysmenorrhea and absenteeism among the respondents.

## RESULTS

The respondents' ages ranged from 12 to 19 years, with the mean age being 15.2 years  $\pm$  1.3. The age range at menarche was between 9 and 16 years. Over two-third of the respondents (70.2%) menstruated for >3 days with most of them (88.5%) using pads for their menses and more than half (54.1%) changing what they use for their menses twice in a day. Majority of the respondents had experienced dysmenorrhea (73.0%). One of the participants of the FGD described her experience of dysmenorrhea thus, "..... You have pain in your abdomen and you feel very dizzy that you will not be able to do anything, you are just feeling useless..."

Almost half of those that experienced menstrual pain (49.7% [167]) had it once in a while and (39% [131]) experienced it with every menses. The prevalence of school absenteeism among those that suffered dysmenorrhea was 13.1% (44) and 15.9% (7) of those missed school during every menstrual period. Most of the girls that missed school, (70.5% [31]), stayed out of school for at least a day and the most common reason for being absent was the severity of the pain experienced as reported by 93.2% (41). Apart from school attendance, some other activities that had been reportedly affected by dysmenorrhea the most were class concentration (17.6% [81]) and class participation (12.2% [56]) [Figure 1].

The greater majority of those who experienced dysmenorrhea (81.3% [273]) suffered mild-to-moderate pain, whereas only 18.8% (63) admitted to experiencing severe pain. The severe pain was responsible for absenteeism among 63.6% (26) of respondents who represented the greatest proportion of absentees. During the discussion session, respondents were of the opinion that absenteeism from school can be reduced if some measures were put in place. One said ".....The school should provide drugs for girls so that they can use it when they have pain." Another said "....If you know that you are likely to have pain this month, you can take your drug that you normally use inside your bag and when you start feeling the pain in school, you can take the drug and if you need to rest, you can rest a little while."

There were different pain relief strategies adopted by respondents. Out of those that experienced dysmenorrhea, only 11.9% (40) used analgesics always while 29.2% (98) used it occasionally for menstrual pain relief. About a fifth (19.9% [67]) always engaged in exercise while 25.3% (85) exercised sometimes to either relieve or prevent the pain. Slightly above half of those that had menstrual pain, (51.8% [174]) always reduced their sugar intake as a way to relieve/prevent the pain, while 11.3% (38) did so occasionally. For those that used drugs to relieve or prevent pain, only 6.8% (23) of those that experience dysmenorrhea obtained their prescription from a medical doctor, 8.9% (30) obtained theirs from a nurse, 13.7% (46) indulged in self-medication, and 15.8% (53) reported that family members recommended the drugs that they used. Only a minority of those that experienced

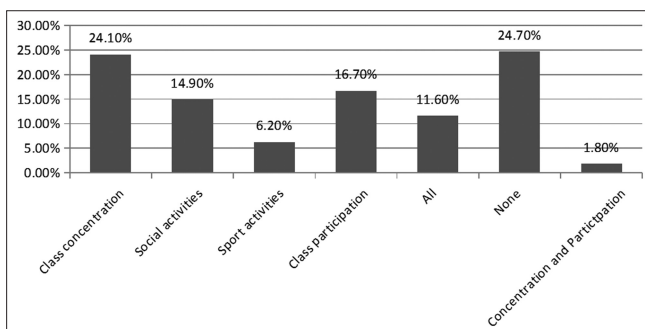


Figure 1: Other activities that are affected by dysmenorrhea (n = 336)

dysmenorrhea, (12.8% [43]) had ever visited a doctor for treatment or medical advice. Majority of those that had visited a doctor before (83.7%, [36]) did so because the pain was unbearable, whereas 18.1% (53) thought menstrual pain is a normal part of a girl’s life and did not see the need to visit a doctor. At the discussion session, the participants aired their opinion on visiting the hospital because of menstrual pain, with one discussant saying “.....I think it is not normal to go to the hospital because of menstrual pain because it is a natural thing that one must cope with. As for me, it is a shameful thing to go to the hospital because of menstrual pain.”

Furthermore, slightly above half of the respondents (53%) took part in physical exercises such as running, jogging, and skipping. While only 29% (97) did so specifically to reduce or prevent menstrual pain.

The Chi-square test revealed that the age and duration of menstruation were statistically significant in the experience of dysmenorrhea among the study group [Table 1]. Severity of pain, as well as the age of the respondents, was also significantly associated with school absenteeism [Table 2].

Furthermore, the age (odds ratio [OR] = 3.5, P = 0.019) and duration of menstrual flow (OR = 1.7, P = 0.022) were the

Table 1: Experience of dysmenorrhea

Variables	Experience of dysmenorrhea, n (%)		$\chi^2$	P
	Yes	No		
Age at last birthday				
≤13	22 (6.5)	13 (10.5)	15.735	0.003*
14	74 (22)	41 (33.1)		
15	103 (30.7)	42 (33.9)		
16	78 (23.2)	19 (15.3)		
≥17	59 (17.6)	9 (7.3)		
Duration of menstruation				
3 days	89 (26.5)	48 (38.7)	6.469	0.011*
>3 days	247 (73.5)	76 (61.3)		

\*Statistically significant at P<0.05

Table 2: Association between sociodemographic/ menstrual characteristics and absenteeism

Variables	Absenteeism, n (%)		$\chi^2$	P
	No	Yes		
Age at last birthday				
≤13	17 (5.8)	5 (11.4)	14.255	0.007*
14	64 (21.9)	10 (22.7)		
15	95 (32.5)	8 (18.2)		
16	72 (24.7)	6 (13.6)		
≥17	44 (15.1)	15 (34.1)		
Severity of menstrual pain				
Mild	115 (39.4)	11 (25.0)	16.448	0.000*
Moderate	132 (45.2)	15 (34.1)		
Severe	45 (15.4)	18 (40.9)		

\*Statistically significant at P<0.05

factors that predicted dysmenorrhea among the respondents [Table 3]. Age at menarche had no significant relationship with the experience of dysmenorrhea. The severity of pain was the main factor responsible for absenteeism among the school girls. Those that experienced severe pain were more likely to be absent from school (OR = 4.2;  $P = 0.001$ ). Age was not statistically significant [Table 4].

## DISCUSSION

The prevalence rate of dysmenorrhea found in this study was 73%, which is quite similar to the results obtained in previous studies.<sup>10-12</sup> Though higher than what was found among undergraduates of a higher institution in the Southwestern part of Nigeria.<sup>13</sup>

A wide range of disparities in the prevalence of dysmenorrhea has been reported by several researchers with some indicating prevalence's as low as 15% to as high as 94%.<sup>14-17</sup> More than a third of the respondents that experienced dysmenorrhea did so with every menstrual cycle. Majority of them experienced the pain before the commencement of their menstruation as has been observed in previous studies.<sup>18,19</sup>

Notably, only 13.1% out of those that experienced various degrees of dysmenorrhea had been absent from school because of menstrual pain, and this finding is similar to

the findings by Fawole *et al.* although lower than results obtained in Ile-Ife and higher than result obtained in Accra, Ghana.<sup>11,20,21</sup> Among those who were absent as a result of menstrual pain, the majority of them missed a greater portion of the school day with 15.9% missing school every month. Almost, two-thirds of those who had missed school suffered from severe dysmenorrhea.

A significant association between school absenteeism and severity of dysmenorrhea was identified by this study with the severity of dysmenorrhea being predictive of school absenteeism even after controlling for age. This is similar to results of previous studies that have found an association between absenteeism from school and severe dysmenorrhea.<sup>22</sup> Apart from school attendance, other school activities that were significantly affected were class participation as well as social and sporting activities. This corroborates the findings among adolescent girls in Egypt where dysmenorrhea was significantly associated with school absenteeism and decreased academic performance, sports participation, and socialization with peers.<sup>23</sup> The need to keep girls in school cannot be overemphasized as the positive health, and developmental gains are beneficial not only for the girls themselves but extend into the next generation. This has been corroborated by research evidence showing that girl child education is associated with better health outcomes and higher educational attainment for her children, as well as improved socioeconomic status for the family.<sup>6</sup> Other school activities that were affected by dysmenorrhea were class concentration and participation. Class concentration affected about a fifth of the respondents though this is lower than what has been observed by other researchers.<sup>24,25</sup> Participation in class and in other social activities were also reportedly affected.

This study found out that the most common method adopted to prevent or relieve menstrual pain was to reduce sugar intake. The consumption of sugar and other foods that have a high glycemic index have been associated with the development of inflammation in the body with prostaglandins playing a key.<sup>26,27</sup> Prostaglandins are also responsible for the reduction of blood flow to the uterus as well as uterine contractions and subsequent pain that occurs with dysmenorrhea.<sup>28</sup> The reduction of sugar intake by these respondents as a method of pain relief or prevention clearly has a physiological basis for its effectiveness. Other methods adopted by the girls included reducing fatty foods as well as relaxation/rest. These methods have been documented by other researchers as nonpharmacological methods of managing dysmenorrhea.<sup>10</sup> This study also found out that the common medications used by the girls were analgesics, antispasmodics, and nonsteroidal anti-inflammatory drugs (NSAIDs), whereas a large proportion of the respondents did not use any drugs irrespective of the intensity of the pain. This corroborates the submission of previous writers on the management of dysmenorrhea as it was observed that the most common medications used for the relief of pain were over-the-counter analgesics such as acetaminophen and NSAIDs.<sup>19</sup> Oral contraceptive pills have

**Table 3: Predictors of experience of dysmenorrhea among respondents**

Variable	OR	95% CI	P
Age as at last birthday			
≤13	1		
14	1.0	0.5-2.3	0.966
15	1.3	0.6-2.9	0.531
16	2.0	0.8-5.0	0.130
≥17	3.5	1.2-9.7	0.019*
Duration of menses			
3 days	1		
>3 days	1.7	1.1-2.6	0.022*

\*Statistically significant at  $P < 0.05$ . OR – Odds ratio; CI – Confidence interval

**Table 4: Predictors of absenteeism among respondents**

Variable	OR	95% CI	P
Age as at last birthday			
≤13	1		
14	0.6	0.2-1.9	0.348
15	0.3	1.0-1.2	0.101
16	0.3	0.1-1.0	0.068
≥17	1.3	0.4-4.3	0.679
Severity of menstrual pain			
Mild	1		
Moderate	1.2	0.5-2.8	0.627
Severe	4.2	1.7-9.9	0.001*

\*Statistically significant at  $P < 0.05$ . OR – Odds ratio; CI – Confidence interval



also been documented to provide relief for dysmenorrhea; however, this was rarely used by these respondents.<sup>29</sup> About half of those that experienced dysmenorrhea admitted that the drugs used were very effective.

A small proportion of those that experienced menstrual pain (12.8%) had ever visited a medical doctor for treatment/advice on the relief or treatment of menstrual symptoms. This was attributed to the fact that they felt the pain could be managed and was a normal experience. This is similar to the findings of other researchers who have observed a culture of silence among the sufferers of dysmenorrhea with many of them believing that it was a part of the life of a woman that must be endured.<sup>30,31</sup> This view was also corroborated by participants of the FGDs where majority of them believed that menstrual pain is a “normal thing” for girls and not an illness; therefore, medical treatment is not necessary.

The findings of this study revealed that about half of the respondents engaged in one form of exercise or the other but only about a third of those that experienced dysmenorrhea engaged in physical exercise as a means of reducing menstrual pain. Almost all respondents that engaged in exercise said that it was effective in reducing the intensity of the pain felt; although, this was not statistically significant. There have been divergent views in the literature regarding the efficacy of exercise in the relief of dysmenorrhea. Our findings are in tandem with Shahr-Jerdy *et al.* who reported that women who took part in the regular, moderate, aerobic exercise had fewer negative effects, such as impaired concentration, pain, and behavioral changes than nonexercisers during period cycles.<sup>32</sup> However, other researchers have questioned the representativeness of this finding on the premise that evidence-based studies are limited.<sup>12</sup>

Age and the duration of menses were factors that were found to be significantly associated with the experience of dysmenorrhea in this study. It was observed that respondents that were in late adolescence ( $\geq 17$  years), as well as those whose menstrual cycles are  $>3$  days, were more likely to experience dysmenorrhea. This may be due to the fact that all the respondents are adolescents and studies have shown that dysmenorrhea peaks in late adolescence and the early 20s.<sup>24</sup> We acknowledge the limitations inherent in this study. The study design being cross-sectional in nature precludes any establishment of causality between variables. In addition, with the self-report of menstrual experiences that have occurred in the past, recall bias cannot be ruled out. Despite these limitations, our findings have implications for the design of health interventions for this relatively underserved condition.

## CONCLUSION

Our findings shed light on the prevalence of dysmenorrhea among this study group and the extent to which this leads to school absenteeism. It is evident that dysmenorrhea is a prevalent condition among these girls with resultant negative effects on school activities as well as school attendance.

Self-medication as initiated by the respondents or family members was a common practice as most of them did not obtain prescriptions from certified medical personnel. It is, therefore, important to promote easy access to health-care workers to ensure correct prescriptions and avoid the negative consequences that could arise with indiscriminate use of drugs. Nurses in school clinics and youth-friendly health services could be viable options for this. This would also serve to reduce school absenteeism. The potential for nonpharmacological options for pain relief such as dietary control and exercise should be explored further. These could be used in place of pharmacological options or in conjunction with them as the need arises.

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## Conflicts of interest

There are no conflicts of interest.

## REFERENCES

- Chen CH, Lin YH, Heitkemper MM, Wu KM. The self-care strategies of girls with primary dysmenorrhea: A focus group study in Taiwan. *Health Care Women Int* 2006;27:418-27.
- Kural M, Noor NN, Pandit D, Joshi T, Patil A. Menstrual characteristics and prevalence of dysmenorrhea in college going girls. *J Family Med Prim Care* 2015;4:426-31.
- Hailemeskel S, Demissie A, Assefa N. Primary dysmenorrhea magnitude, associated risk factors, and its effect on academic performance: Evidence from female university students in Ethiopia. *Int J Womens Health* 2016;8:489-96.
- De Sanctis V, Soliman A, Bernasconi S, Bianchin L, Bona G, Bozzola M, *et al.* Primary dysmenorrhea in adolescents: Prevalence, impact and recent knowledge. *Pediatr Endocrinol Rev* 2015;13:512-20.
- Iacovides S, Avidon I, Baker FC. What we know about primary dysmenorrhea today: A critical review. *Hum Reprod Update* 2015;21:762-78.
- Roudi-Fahimi F, Moghadam VM. Empowering women, developing society: Female education in the Middle East and North Africa. *Popul Ref Bur* 2003;1-8. Available from: <https://assets.prb.org/pdf/EmpoweringWomeninMENA.pdf>. [Last accessed on 2017 Apr 05].
- Sidi I, Hounkpatin B, Obossou AA, Salifou K, Vodouhe M, Denakpo J, *et al.* Primary dysmenorrhea in the schools of Parakou: Prevalence, impact and therapeutic approach. *Gynecol Obstet (Sunnyvale)* 2016;6:376. [doi: 10.4172/2161-0932.1000376].
- National Population Commission and ICF Macro. Nigeria Demographic and Health Survey 2008. Abuja, Nigeria: National Population Commission and ICF Macro; 2008.
- Kish L. Survey Sampling. New York: John Wiley and Sons, Inc.; 1965.
- Emmanuel A, Achema G, Gimba SM, Mafuyai MJ, Afoi BB, Ifere IO. Dysmenorrhea: Pain relief strategies among a cohort of undergraduates in Nigeria. *Int J Med Biomed Res* 2013;2:142-6. Available from: <http://www.ajol.info/index.php/ijmbr/article/view/92815>. [Last accessed on 2017 Apr 17].
- Olowokere A, Oginni M, Olajubu A, William A, Irinoye O. Menstrual disorders: The implications on health and academic activities of female undergraduates in a federal university in Nigeria. *J Nurs Educ Pract* 2014;4:126-35. Available from: <http://www.sciedu.ca/journal/index.php/jnep/article/view/3803/2595>. [Last accessed on 2017 Apr 17].
- Onur O, Gumus I, Derbent A, Kaygusuz I, Simavli S, Urun E, *et al.* Impact of home-based exercise on quality of life of women with primary dysmenorrhea. *South Afr J Obstet Gynaecol* 2012;18:15-8. Available from: <http://www.sajog.org.za/index.php/SAJOG/article/view/391/255>. [Last accessed on 2017 Apr 25].
- Titilayo A, Agunbiade OM, Banjo O, Lawani A. Menstrual discomfort

- and its influence on daily academic activities and psychosocial relationship among undergraduate female students in Nigeria. *Tanzan J Health Res* 2009;11:181-8.
14. Avasarala AK, Panchangam S. Dysmenorrhoea in different settings: Are the rural and urban adolescent girls perceiving and managing the dysmenorrhoea problem differently? *Indian J Community Med* 2008;33:246-9.
  15. 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;27:765-70.
  16. 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;189:138-43.
  17. Cakir M, Mungan I, Karakas T, Giriskan I, Okten A. Menstrual pattern and common menstrual disorders among university students in Turkey. *Pediatr Int* 2007;49:938-42.
  18. Charu S, Amita R, Sujoy R, Thomas GA. Menstrual characteristics and prevalence and effect of dysmenorrhea on quality of life of medical students. *Int J Collab Res Intern Med Public Health* 2012;4:275-97.
  19. Dawood MY. Primary dysmenorrhea: Advances in pathogenesis and management. *Obstet Gynecol* 2006;108:428-41.
  20. Fawole AO, Babarinsa IA, Fawole OI, Obisesan KA, Ojengbede OA. Menstrual characteristics of secondary school girls in Ibadan, Nigeria. *West Afr J Med* 2009;28:92-6.
  21. Gumanga SK, Kwame-Aryee R. Prevalence and severity of dysmenorrhea among some adolescent girls in a secondary school in Accra, Ghana. *Postgrad Med J Ghana* 2012;1:1-6. Available from: <https://www.gcps.edu.gh/wp-content/uploads/2014/09/Prevalence-and-severity-of-dysmenorrhoea-among-some-adolescent-girls-in-a-secondary1.pdf>. [Last accessed on 2017 Apr 27].
  22. Zannoni L, Giorgi M, Spagnolo E, Montanari G, Villa G, Seracchioli R. Dysmenorrhea, absenteeism from school, and symptoms suspicious for endometriosis in adolescents. *J Pediatr Adolesc Gynecol* 2014;27:258-65.
  23. Mohamed E. Epidemiology of dysmenorrhea among adolescent students in Assiut city, Egypt. *Life Sci J* 2012;9:348-53. Available from: [http://www.lifesciencesite.com/ljsj/life0901/050\\_8058life0901\\_348\\_353.pdf](http://www.lifesciencesite.com/ljsj/life0901/050_8058life0901_348_353.pdf). [Last accessed on 2017 Apr 27].
  24. Al-Kindi R, Al-Bulushi A. Prevalence and impact of dysmenorrhoea among Omani high school students. *Sultan Qaboos Univ Med J* 2011;11:485-91.
  25. Banikarim C, Chacko MR, Kelder SH. Prevalence and impact of dysmenorrhea on hispanic female adolescents. *Arch Pediatr Adolesc Med* 2000;154:1226-9.
  26. Collier B, Dossett LA, May AK, Diaz JJ. Glucose control and the inflammatory response. *Nutr Clin Pract* 2008;23:3-15.
  27. Ricciotti E, FitzGerald GA. Prostaglandins and inflammation. *Arterioscler Thromb Vasc Biol* 2011;31:986-1000.
  28. Campbell MA, McGrath PJ. Non-pharmacologic strategies used by adolescents for the management of menstrual discomfort. *Clin J Pain* 1999;15:313-20.
  29. Proctor ML, Roberts H, Farquhar CM. Combined oral contraceptive pill (OCP) as treatment for primary dysmenorrhoea. *Cochrane Database Syst Rev* 2001;(4):CD002120.
  30. Weissman AM, Hartz AJ, Hansen MD, Johnson SR. The natural history of primary dysmenorrhoea: A longitudinal study. *BJOG* 2004;111:345-52.
  31. Rostami M. The study of dysmenorrhea in high school girls. *Pak J Med Sci* 2007;23:928-31.
  32. Shahr-Jerdy S, Hosseini RS, Maghsoud E. Effect of stretching exercise on primary dysmenorrhea in adolescent girls. *Biomed Hum Kinet* 2012;4:127-32.