International Journal of Medicine & Health Research

www.advancejournals.org
Open Access Scientific Publisher

Research Article

MENSTRUAL CHARACTERISTICS AND PREVALENCE OF DYSMENORRHOEA AMONG FEMALE PHYSIOTHERAPY STUDENTS

Salvi Shah[1], Kristina Makwana[1], Pravajya Shah[1]
[1]SPB Physiotherapy College, Ugat-Bhesan Road, Surat, Gujarat India

Correspondence should be addressed to **Salvi Shah**

Received March 19, 2015; Accepted April 27, 2015; Published April 03, 2015;

Cite This Article: Shah, S., Makwana, K., Shah, P. (2015). Menstrual characteristics and prevalence of dysmenorrhoea among female physiotherapy students. International Journal of Medicine & Health Research, 1(1). 1-8

ABSTRACT

Background: A common gynaecological problem encountered among female students is dysmenorrhoea, which also appears to be a leading cause of absenteeism from college. Hence arises a need to evaluate the menstrual characteristics and prevalence of dysmenorrhoea along with its severity among students.

Materials and methodology: This cross-sectional study was conducted between March 2014 to July 2014 at SPB Physiotherapy College, Surat, Western India. The study group included 133 female students. The data was collected by general assessment form, questionnaires regarding menstrual characteristics and dysmenorrhoea, Visual analogue scale (VAS) and Verbal multidimensional scoring system (VMSS) for assessment of dysmenorrhoea severity. Percentages and Chi-square test were used for statistical analyses.

Results: The average age of the participants was 20.8 ± 1.8 years (range 17–23 years).Prevalence of dysmenorrhoea was found to be 71.2%.There was an association between dysmenorrhea and coffee consumption, choclate consumption, menstrual bleeding duration days, menstrual cycle regularity, family history of dysmenorrhoea, any gynaecological diseases ($P < 0.05$, for each one). Among dysmennorhic respondents, visual analog scale (VAS) for pain of dysmenorrhoea was 1-3 (n=48), 4-7(n=19), 8-10 (n=22).

Conclusion: Dysmenorrhoea is a very common problem among girls and it affects their quality of life. It can be better managed by mental preparation and by appropriate change in lifestyle like regular physical exercise and with assurance to the students. It is important to spread awareness about the causes and treatment of dysmenorrhoea to avoid undue sufferings causing absenteeism from work and studies.

KEY WORDS: Dysmenorrhoea, Menstrual characteristics, VAS

INTRODUCTION

Dysmenorrhoea is the most common gynaecological disorder in women of reproductive age. [1]

The term dysmenorrhoea is derived from the greek words dys (difficult, painful or abnormal), meno (month) and rrhea (flow).[2] It is defined as painful menses in women usually beginning during adolescence. It is characterized by campy pelvic pain beginning shortly before or at the onset of menses and lasting 1 to 3 days. [3] Duration of the pain is usually 8 to 72 hours and is usually associated with

menstruation. Identification of dysmenorrhoea and associated features like vomiting, giddiness, mood changes was done around middle of 19th century.[4]

Dysmenorrhoea may be categorized into two distinct types: primary and secondary. Primary dysmenorrhoea is defined as painful menses in women with normal pelvic anatomy, usually beginning during adolescence. The onset of primary dysmenorrhoea is usually 6 to 12 months after menarche, which coincides with the occurrence of regular ovulatory cycles. [5] Secondary dysmenorrhoea is menstrual pain associated with underlying pathology, and its onset may be years after menarche. It can be caused by any of a dozen or so 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.[6]

The aetiology of primary dysmenorrhoea is not precisely understood but most symptoms can be explained by the action of uterine prostaglandins, particularly PGF2α. The disintegrating endometrial cells release PGF2α as menstruation begins. PGF2α stimulates myometrial contractions, ischemia and sensitization of nerve endings. These levels are highest during the first two days of menses when symptoms peak. [7] The risk factors for dysmenorrhoea are; age < 20 years, nulliparity, heavy menstrual flow, smoking, high/upper socio economic status, and attempts to lose weight, physical activity, disruption of social networks, depression and anxiety.[8]

Dysmenorrhoea specifically is a leading gynaecologic complaint, resulting in a significant number of both work and school absences. [9][10] In fact, it is estimated that over 600 million hours are lost from work each year due to dysmenorrhoea.[11] In adolescents, absenteeism from school or work due to dysmenorrhoea ranged from 14% [9] to 51% [12]of girls and decreased participation in school-related functions ranged from 29% to 50%.[13] In those with severe dysmenorrhoea, 50% missed school.[9] Such absences diminish opportuniies for successful educational, psychosocial, and cognitive development during the critical period of adolescent growth.

Studies on the prevalence of menstrual pain have shown that many factors are related to this disorder. These factors include a younger age, low body mass index (BMI), smoking, early menarche, prolonged or aberrant menstrual flow, perimenstrual somatic complaints, pelvic infections, previous sterilization, somatization, psychological disturbance, genetic influence, and a history of sexual assault influencing the prevalence and severity of dysmenorrhoea.[14]

There is also some evidence of a dose–response relationship between exposure to environmental tobacco smoke and increased incidence of dysmenorrhoea. [15] Childbirth, in contrast, appears to relieve dysmenorrhoea.[12]

The results of studies carried out in North America, China, Australia, Turkey and Iran have shown that the prevalence of primary dysmenorrhoea and percentage of women involved are different from society to society.[16][17][18][19][20] Based on findings of these and other studies, dysmenorrhoea is one of the most important health issues of young girls which must be considered because many researchers claimed that primary dysmenorrhoea affects between 50 to 90% of general population.[12][14][21][22][23][24][25][26]

A dysmenorrhoea incidence of 33.5% was reported by Nag in 1982 [27], among adolescent girls in India. A study done in Sweden [4] showed that more than 50% of all menstruating women experience some discomfort. It has also been reported by a senior obstetrician that probably 5 – 10% of girls in their late teens suffer from severe spasmodic dysmenorrhoea interrupting their educational and social life.[28]

A study of the prevalence of dysmenorrhoea and its associated risk factors would provide evidence of the severity of the problem. The aim of the present was to evaluate the prevalence of dysmenorrhoea and its associated risk factors among female students of SPB Physiotherapy College, Surat city, Western India.

MATERIALS AND METHODOLOGY

Study design

Observational study

Duration of study

Study is one time study

Procedure

This study was conducted between March 2014 to July 2014 in the College after giving due consideration to inclusive & exclusive criteria. The number of the students studying in the college was 200, most of them girls (n=172).The study was performed on a total of 125 students who agreed to participate in the research. Of the 172 students, 47 were excluded from the survey due to: unwillingness to participate in the research (n = 20), and not being at classes at the time of the study (n =27). The remaining 125 female students constituted the study group and consent was taken.

The data was collected by general assessment form, questionnaires regarding menstrual characteristics and dysmenorrhoea, VAS and verbal multidimensional scoring system for assessment of dysmenorrhoea severity. The General assessment form and questionnaire were pre-tested on 10 students out of 125 included in the study. Necessary modifications were made in the assessment form and questionnaires before the start of study. The General assessment form and questionnaires were distributed to the 125 students agreed to participate in the study.

After distributing the questionnaires to students at the college, 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 and inventories in the presence of a member of the research team. The data collected was self-reported

by the students. All subjects (n = 125) were told that participation in the investigation was strictly voluntary, and that the data collected would not be used for anything except for this research study, and they were given the questionnaire to complete. The duration for completing the questionnaire was between 35 and 40 minutes per subject.

Questionnaire

The questionnaire consists of two parts.

The questionnaire, prepared with reference to previous studies in the literature [29][30][31], included two parts.

In the first part of the questionnaire include about student's socio-demographic data, medical characteristics, habits, questions related to menstruation and dysmenorrhoea history. The second part of the questionnaires included visual analogue scale (VAS) questions and Verbal multidimensional scoring system (VMSS) to assess the severity of dysmenorrhea (Table 1). The VAS using a 10-cm line represented the continuum of the female student's opinion of the degree of pain. One extremity of the line represented 'unbearable pain', and the other extremity represented 'no pain at all'. 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 dysmenorrhoea if it was between 1–3 points, moderate between 4–7 points, and severe between 8–10 points.[32] The VMSS system was defined as mild, moderate, and severe based on pain and limited activities. If participant had pain in the abdominal, groin, and lumbar region on the day before the menstrual period and/or the first day of menstrual period, it was considered to be dysmenorrhoea. [4]

If participant experienced menstrual bleeding in equal intervals between 21 and 35 days, it was evaluated as regular menstruation (normal); if the menstruation interval was less than 21 days, it was considered to be short; if the menstruation interval was more than 35 days, it was considered to be long. Menstruation of less than 2 days was accepted as short, between 2 and 6 days as normal, and more than 6 days as long. The presence of dysmenorrhoea in participant's mother or sister was accepted as a positive family history of dysmenorrhoea.

Following the completion of the questionnaires and inventory, the participants' body mass indexes (BMIs) were calculated by measuring their heights and weights. Each student's body weight was measured with domestic scales and height with a meter rule. Those who had a BMI of 18.0–24.9 kg/m^{2}were classified as normal weight, adolescents with BMI values that corresponded to a BMI of 25.0–29.9 kg/m^2 were classified as overweight (pre obese), adolescents with BMI values that corresponded to an adult BMI of ≥30.0 kg/m^2 were classified as obese, and adolescents with BMI values that corresponded to <18.0 kg/m^2 as underweight. [31]

The details were entered into Microsoft excel spread sheet (version 2007) and data was statistically analysed using SPSS software at 5% significance level.

Table 1: *Verbal multidimensional scoring system (VMSS) for assessment of dysmenorrhoea severity*

Severity grading	Working ability	Systemic symptoms	Analgesics
Grade 0: Menstruation is not painful and daily activity is unaffected.	Unaffected	None	None required
Mild (Grade 1): Menstruation is painful but seldom inhibits normal activity; analgesics are seldom required; mild pain.	Rarely affected	None	Rarely required
Moderate (Grade 2): Daily activity is affected; analgesics required and give sufficient relief so that absence from school is unusual; moderate pain.	Moderately affected	Few	Required
Severe (Grade 3): Activity clearly inhibited; poor effect of analgesics; vegetative symptoms (headache, fatigue, vomiting, and diarrhoea); severe pain.	Clearly inhibited	Apparent	Poor effect

Severity of dysmenorrhoea according to the verbal multidimentional scoring system (VMSS)

Severity of dysmenorrhea	No (%)
Mild (grade 1)	58(65.17)
Moderate(grade 2)	19(21.35)
Severe(grade 3)	12(13.48)
	Total 89

RESULTS

The average age of the participants was 20.8 ± 1.8 years (range 17–23 years). More than 67.67% of the students (n = 90) were in the age group of 20 and below. Overall the prevalence rate of Dysmenorrhoea among respondents was 71.2% (n= 89). Respondents were classified according to Verbal multidimentional scoring system (VMSS) for severity of dysmenorrhea. (Table 1) Table 2 showed some habits and medical characteristics of students with/without dysmenorrhoea. There was a significant association between coffe consumers ($\chi 2$ =8.117 ,df= 1 and p value =0.0044).,chocolate consumers($\chi 2$ = 7.6229 ,df= 1 and p value =0.0058).), those who have any gynaecological disease ($\chi 2$ =9.267,df= 2 and p value =0.0023).) and dysmenorrhoea. Table 3 showed some menstrual characteristics of students with/without dysmenorrhea. Menstrual cycle regularity, menstrual bleeding duration and family history of dysmenorrhea had significant association with dysmenorrhoea. Among the dysmennorhic respondents (n==89), some important characteristics of dysmenorrhoea and its pain were analysed(Table 4).According to logistic regression analysis performed with variables like coffee consumption ,choclate consumption and positive family history of dysmenorrhoea which showed significantly important findings, is given in Table 5. According to this analysis, coffee consumption (OR 3.151), chocolate consumption (OR 4.019), and positive family history of dysmenorrhoea (OR 3.909) were important risk factors for dysmenorrhoea.

Table 2: *Some habits and medical characteristics of students with/without dysmenorrhoea*

Some habits	Dysmenorrhoea			Statistical analysis, chi-square; *P*
	Yes(%)[a]	No(%)[a]	Total (%)[b]	
Tea consumption				2.561; 0.6128
Yes	44(73.3)	16(26.7)	60(48)	
No	45(69.2)	20(30.8)	65(52)	
Coffe consumption				8.117; 0.0044
Yes	57(81.4)	13(18.6)	70(56)	
No	32(58.2)	23(41.8)	55(44)	
Coke consumption				
Yes	64(71.9)	25(28.1)	89(71.2)	0.076; 0.7828
No	25(69.4)	11(30.6)	36(28.8)	
Choclate consumption				
Yes	35(87.5)	5(12.5)	40(32)	7.6229; 0.0058
No	54(63.5)	31(36.5)	85(68)	
Overweight/obese				
Yes	20(76.9)	6(23.1)	26(20.8)	0.5244; 0.4690
No	69(69.7)	30(30.3)	99(79.2)	
Any gynaecological disease				
Yes	18(51.4)	17(48.6)	35(28)	9.267; 0.0023
No	71(78.9)	19(21.1)	90(72)	
Total	89(71.2)	36(28.8)	125	

[a]*Percent for the row,* [b]*Percent for the column.*

Table 3: *Some menstrual characteristics of students with/without dysmenorrhoea*

Some characteristics	Dysmenorrhoea			Statistical analysis, Chi square; *P*
	Yes (%)[a]	No (%)[a]	Total (%)[b]	
Age at menarche (year)				0.3418;

≤12	4(80)	1(20)	5(4)	0.8429
13-14	75(71.4)	30(28.6)	105(84)	
≥15	10(66.7)	5(33.3)	15(12)	
Menstrual cycle regularity				
Regular	69(71.9)	27(28.1)	96(76.8)	7.567; 0.0059
Irregular	20(69)	9(31.03)	29(23.2)	
Menstrual bleeding duration (days)				
≤6	73(74.5)	25(25.5)	98(78.4)	8.392; 0.0038
≥7	16(59.3)	11(40.7)	27(21.6)	
Use of medicine regulating menstruation				
Yes	10(58.8)	7(41.2)	17(13.6)	1.470; 0.2254
No	79(73.1)	29(26.9)	108(86.4)	
Family history				
Yes	55(69.62)	24(30.38)	79(63.2)	12.70; 0.0004
No	17(37)	29(63)	46(36.8)	
Total	89(71.2)	36(28.8)	125	

[a] *Percent for the row,* [b]*Percent for the column*

Table 4: *Important characteristics of dysmenorrhoea and its pain among dysmennorhic respondents*

Characteristics	**N (%) (0ut of 89)**
Pain location of pain	
Lower abdomen	48(53.93)
Back	19(21.34)
Back and thigh	2(2.25)
Starts in abdomen with radiates to back and thigh	20(22.47)
VAS score	
Mild (1-3)	48(53.93)
Moderate (4-7)	19(21.34)
Severe (8-10)	22(24.72)
In relation with menstruation when pain starts	
9-12 hours before	19(21.34)
5-8 hours before	8(8.99)
1-4 hours before	26(29.21)
1-4 hours after	36(40.45)
For how many days pain of Dysmenorrhoea stays	
Less than 1 day	15(16.85)
1 day	32(35.96)
1-2 days	35(39.33)
2-4 days	5(56.18)
>4 days	2(22.47)
Measures to get rid from pain	
Prone lying position	32(35.96)
Massage	2(2.25)
Hot drink	4(44.94)

Hot water fomentation at painful area	19(21.35)
Hot water bath	2(2.25)
None of above	30(33.71)
Consulted the physician for the pain or symptoms of dysmenorrhoea	
Yes	14(15.73)
No	75(15.73)
Do you take medicine to relieve the symptoms of dysmenorrhea?	
Yes	25(28.09)
No	64(71.91)
Study of participants get affected because of dysmenorrhea	
Does not get affected	23(25.84)
Lack of concentration	36(40.45)
Absent from the class or clinic	13(14.61)
Unable to study	17(19.10)
Dysmenorrhoea in every cycle of last 3 months	
Yes	26(29.21)
No	63(70.79)
Since how long suffering from dysmenorrhea	
Less than or equal to 1 year	16(17.98)
1-3 years	25(28.09)
3-5 years	34(38.20)
Greater than or equal to 5 years	14(15.73)

Table 5: *Significant independent variables for dysmenorrhea according to logistic regression analysis*

Variable	Odds ratio	CI	P value
Coffee consumption (Reference : No)	3.151	1.407 to 7.059	0.0044
Choclate consumption (Reference :No)	4.019	1.426 to 11.33	0.0058
Positive Family history of dysmennorrhoea (Reference: Negative Family history of dysmenorrhea)	3.909	1.815 to 8.420	0.0006

DISCUSSION

Prevalence of dysmenorrhoea in our study was 71.2%. There had been some studies in India from New Delhi [32], Wardha [33], Gwalior [34], Andhra Pradesh [35], Karnataka [36], Tamilnadu [37], and Gujarat [38] which stated prevalence rate of dysmenorrhoea as 33%,56%,79.67%,65%,67.5%,76.30 and 45% respectively. Prevalence rates of dysmenorrhea were found to be 72.7% in Turkey, 74.5% in Malaysia, 72% in Ethiopia and 53.3% in Nigeria.[6][39][40][41] Thus, in a nutshell, prevalence of dysmenorrhea in young female students is high and this finding of our study was in concordance with others.

Pain is extremely subjective symptom and it has been very difficult to quantify pain.[42] Researchers have, therefore, found out a way to measure pain by various scoring systems like VAS. [43] Depending on pain score obtained on VAS, pain was divided into mild, moderate and severe pain and thus it is called 3 point scale. In our study, it was revealed that 53.93%, 21.34% and 24.42% of students had mild, moderate and severe pain (dysmenorrhoea) respectively. Maitri shah et al (2013) conducted a study on 116 nursing students and found that 18% of students were having mild, 40% of students were having moderate and 42% of students were having severe dysmenorrhoea according to VAS. [38]

In our study Coffee consumption, chocolate consumption, any gynaecological disease and menstrual bleeding duration were significantly associated with dysmenorrhea. Result of the present study showed that there was an association between menstrual cycle regularity and dysmenorrhoea. In a recent study Begum J et al found no association between menstrual cycle regularity and presence of dysmenorrhoea. [8] Hong-Gui Zhou et al in a study of 2640 students found that dysmenorrhoea was unrelated to the irregularity of menstrual cycles. [18] In another study, Sundell et al found that severity of dysmenorrhoea was not associated with length of menstrual cycles.[12] Tomoko et al found that dysmenorrhoea scores in students with irregular menstruation were significantly higher than those with regular menstruation.[44]

Family history of dysmenorrhea had a significantly higher prevalence of dysmenorrhea, a finding which is consistent with some studies.[29] This result indicates that a family history of dysmenorrhea seems to be an important characteristic for women with dysmenorrhea. Dysmenorrhea seems to be Familial problem similar conclusion made by Avasarala AK and Panchangam S. in their study. [45] Coffee consumption, chocolate consumption and family history of dysmenorrhoea were an important risk factor for dysmenorrhea, in line with some researchers' studies. [46]

CONCLUSION

Prevalence of the dysmenorrhoea is high in our study population. So from the study it can be concluded that dysmenorrhoea is a very common problem among girls, Such high prevalence makes dysmenorrhea a significant public health problem among young students that demands some attention from policy makers. Girls almost always, silently suffer the pain by dysmenorrhoea and the discomfort associated with it due to lack of knowledge about reproductive health. It is probable that this also affects their academic performance. The findings of this study thus indicate the enormity of the problem and the need for appropriate intervention through a change in lifestyle.

ACKNOWLEDGEMENT

Researchers would like to thank Dr. Anjan Desai, I/C principal of SPB physiotherapy college, Surat for his support and encouragement during this study. Researchers also thank the student participants for their co-operation.

REFERENCES

[1] Wang L, Wang X, Wang W, Chen C, Ronnennberg AG, Guang W, Huang A, Fang Z, Zang T, Wang L, Xu X :Stress and dysmenorrhoea: A population based prospective study. Occup Environ Med.2004,61:1021–1026.

[2] Kiran B, Tasneem sandozi, Akila L, Ananya chakraborty ,Meherban R ,Jamuna rani: A study of the prevalence, severity and treatment of Dysmenorrhoea in medical and nursing students. International Journal of Pharma and Bio Sciences. 2012, Vol 3(1).

[3] Adeyemi AS, Adekanle DA: Management of dysmenorrhoea among medical students. Int J Gynecol Obstet. 2007, 71528–39.

[4] Andersch B. Milson: An epidemiological study of young women with dysmenorrhoea. Am. J. Obs. Gynaecol., 1982, 144: 655-660.

[5] Abbaspour Z., Rostami M., Najjar Sh.: The Effect of Exercise on Primary Dysmenorrhea. J Res Health Sci, 2006,6 (1): 26-31

[6] Alaettin Unsal, Unal Ayranci, Mustafa Tozun,Gul Arslan, Elif Calik: .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.

[7] Andrew S, Coco MD. Primary dysmenorrhoea. Am Fam Physician.1999;60:489-496

[8] Begum J: Menstrual Pattern and Common Menstrual Disorders among Students in Dinajpur Medical College. Dinajpur Med Col J. 2009 Jul, 2 (2):37-43.

[9] Klein JR, Litt IF: Epidemiology of Adolescent Dysmenorrhea. Pediatrics. 1981, 68(5):661–4.

[10] Hillen TI, Grbavac SL, Johnston PJ, Straton JA, Keogh JM: Primary dysmenorrhea in young Western Australian women: prevalence, impact, and knowledge of treatment. Journal of Adolescent Health. 1999,25(1):40–5.

[11] Dawood MY: Dysmenorrhea. The Journal of Reproductive Medicine. 1985, 30(3):154–67.

[12] Sundell G, Milsom I, Andersch B: Factors influencing the prevalence and severity of dysmenorrhoea in young women. British Journal of Obstetrics and Gynecology. 1990, 97:588–94.

[13] Banikarim C, Chacko MR, Kelder SH: Prevalence and impact of dysmenorrhea on Hispanic female adolescents. Archives of Pediatric Adolescent Medicine. 2000, 154(12):1226–9.

[14] Tonini G: Dysmenorrhea, endometriosis and premenstrual syndrome. Minerva Pediatr. 2002, 54: 525–38.

[15] Chen C, Cho SI, Damokosh AI et al: Prospective study of exposure to environmental tobacco smoke and dysmenorrhea. Environ Health Perspect 2000,108:1019–102

[16] Ortiz, M.I., E. Rangel-Flores, L.C. Carrillo-Alarcyn ,H.A. Veras-Godoy: Prevalence and impact of controlled trials, primary dysmenorrhea among Mexican high school students. Int. J. Gynaecol. Obstet. 2009,107(3): 240-3.

[17] Hong-Gui, Z.,Y. Zheng-Wei: Students Group, Prevalence of dysmenorrhea in primary dysmenorrhea in women; A randomize controlled Trial. Evidence-based complementary and prospective study. Health. 2010,2(4): 311-314.

[18] Thirza, I., J. Hillen, L. Shannon, J. Grbavac, F. Martinelli ,S. Ciatto, John M.F. Keogh: Primary dysmenorrhea resistant to conventional medical treatment. Prevalence, Impact and knowledge of treatment. Journal of Adolescent Health. 1999,25(1): 40-45.

[19] Alaettin, U., A. Unal ,T. Mustafa:To determine and correlates the prevalence of dysmenorrhea in a group of women. Pak. J. Med. Sci. 2010,26: 335-340.
[20] Shavandi, N., F. Taghian, V. Soltani: The effect of isometric on primary dysmenorrhea.Arak Medical University Journal (AMUJ). 2009,13(1): 71-77
[21] Banikarim, C., M.R. Chacko , S.H. Kelder: Prevalence and impact of dysmenorrhea on Hispanic female adolescents. Archives of Pediatric and Adolescent Medicine. , 2000, 154: 1226-1229.
[22] Zondervan, K.,P.L. Yudbin: The prevalence of chronic pelvic pain in women in the United Kingdom: a systematic review. British Journal Obstetrics and Gynecology.1988, 30: 93-99.
[23] Davis, A.R. , C.L. Westhoff: .Primary dysmenorrhea in adolescent girls and treatment with oral contraceptives. J. Pediatr Adolesc Gynecol. 2001, 14(1): 3-8
[24] Sharma, M., S. Gupta: Menstrual pattern and abnormalities in high school girls of Dhahran: a cross sectional study in two boarding school: Epidemiology Nepal Medical College Journal. 2003,5: 34-36.
[25] Houston, A.M., A. Abraham, Z. Huang , L.G. D'Angelo: Knowledge, attitudes and consequences of menstrual health in Urban adolescent females. J. Pediatr Adolesc Gynecol. 2006, 19: 271-275.
[26] Lee, L.K., P.C. Chen, K.K. Lee ,J. Kaur: Factors influencing the prevalence and severity of Menstruation among adolescent girls in Malaysia: a cross- sectional school survey. Singapore Med. J. 2006, 47: 869-874
[27] Nag RM: Adolescent in India. Calcutta: Medical Allied Agency; 1982, 18–26.
[28] Dawn C:. Textbook of Gynaecology and Contraception. 10th ed. Calcutta: Dawn Books; 1990.
[29] Polat A, Celik H, Gurates B, Kaya D, Nalbant M, Kavak E, et al: Prevalence of primary dysmenorrhea in young adult female university students. Arch Gynecol Obstet. 2009, 279:527–32.
[30] Balbi C, Musone R, Menditto A, Di Prisco L, Cassese E, D'Ajello M, et al: Influence of menstrual factors and dietary habits on menstrual pain in adolescence age. Eur J Obstet Gynecol Reprod Biol. 2000, 91:143–8.
[31] Patel V, Tanksale V, Sahasrabhojanee M, Gupte S, Nevrekar P: The burden and determinants of dysmenorrhoea: a population-based survey of 2262 women in Goa, India. BJOG. 2006, 113:453–63.
[32] Larroy C: Comparing visual-analog and numeric scales for assessing menstrual pain. Behav Med. 2002,27: 179–81.
[33] Sharma A, Taneja DK, Sharma P: Problems Related to Menstruation and Their Effect on Daily Routine of Students of a Medical College in Delhi, India. Asia Pac J Public Health. July 2008, 20(3):234-41.
[34] Dambhare DG, Wagh SV, Dudhe JY: Age at menarche and menstrual cycle pattern among school adolescent girls in Central India. Global journal of health science. 2012,4(1):105-11.
[35] Anil K Agarwal, Anju Agarwal: A Study of Dysmenorrhea during Menstruation in Adolescent Girls. Indian J Community Med. 2010 January, 35(1): 159–164.
[36] Suresh K. Kumbhar, Mrudula Reddy, Sujana B., Roja Reddy K., Divya Bhargavi K., C. Balkrishna: Prevalence of dysmenorrhea among Adolescent girls (14-19 yrs) of kadapa district and its impact on quality of life: a cross sectional study. National Journal of Community Medicine. 2011,2 (2).
[37] Shrotriya Charu, Ray Amita, Ray Sujoy, George Aneesh Thomas: 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. April 2012,4(4).
[38] Maitri Shah, Anuradha Monga Sangita Patel, Malay Shah, Harsh Baksh: A study of prevalence of primary dysmenorrhea in young students - A cross-sectional study. Healthline. 2013, 4 (2)
[39] Wong LP, Khoo EM: Dysmenorrhea in a multiethnic population of adolescent Asian girls. Suppl Int J Gynaecol Obstet. 2010, 108(2):139-42.
[40] Zegeye D, Megabiaw B, Mulu A: Age at menarche and the menstrual pattern of secondary school adolescents in northwest Ethiopia. BMC Women's Health. 2009,9(1):29.
[41] Loto OM, Adewumi TA, Adewuya AO: Prevalence and correlates of dysmenorrhea among Nigerian college women. Aust N Z J Obstet Gynaecol. 2008, 48(4):442-4.
[42] Mcguire DB: The Measurement of Clinical Pain. Nursing Research. 1984, 33(3):152-156.
[43] Analogue V: Visual Analogue Scale. Management of pain in older people. 2007, 26.
[44] Tomoko et al: Young Japnese College students with Dysmenorrhoea, Irregular Menstruation and Premenstrual Symptoms. The Open Medical Informatics Journal. 2000, 1, 8-11.
[45] 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 Oct,33(4):246-9.
[46] Chayachinda C, Rattanachaiyanont M, Phattharayuttawat S, Kooptiwoot S: Premenstrual syndrome in Thai nurses. J Psychosom Obstet Gynaecol. 2008, 29:199–205.