Dysmenorrhea in adolescents and young adults: a review in different countries

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Summary. *Background:* Dysmenorrhea is still an important public health problem which may have a negative impact on female health, social relationships, school or work activities and psychological status. *Methods:* The aim of this review is a better understanding of the epidemiology of dysmenorrhoea and its effect on public health. Published studies in English providing relevant information on dysmenorrhea were identified by searching PubMed, Embase and Google; restricting the population to adolescents and young adult women and the year of publishing from 2010 to August 2015, based on the keywords 'dysmenorrhea', 'adolescents' and 'epidemiology'. In addition, the reference lists of the selected articles were examined. *Results:* We found 50 studies that met our inclusion criteria. The majority were cross-sectional studies on 41,140 adolescents and young women published from 2010 onward. The prevalence of dysmenorrhea varied from 34 % (Egypt) to 94% (Oman) and the number of participants, reporting very severe pain varied from 0.9 % (Korea) to 59.8% (Bangladesh). Adolescents who missed school due to dysmenorrhoea ranged from 7.7% to 57.8% and 21.5% missed social activities. About 50% of students (53.7%-47.4%) reported a family history of dysmenorrhea. Incidence of dysmenorrhea was 0.97 times lower as age increased (p <0.006). Despite the high prevalence of dysmenorrhea in adolescents, many girls did not receive professional help or treatment. Mothers were the most important persons the girls turned to for answers regarding menstruation, followed by peers (52.9%) and school nurse. From 21% to 96% practised self–medication either by pharmacological or non pharmacological interventions. The limitation of these studies was that they did not distinguish between primary dysmenorrhea and secondary dysmenorrhea. *Conclusions:* The main gynecological complaint of adolescents is dysmenorrhea. Morbidity due to dysmenorrhea represents a substantial public health burden. It is one of the leading causes of absenteeism from school and work and is responsible for significant diminished quality of life. Despite its high prevalence and associated negative effects, many adolescents do not seek medical care for this condition. Appropriate counselling and management should be instituted among female students to help them cope with the challenges of dysmenorrhea. Information, education and support should also be extended to parents, school peer leaders, and hostel administrators in order to address the reproductive health needs of the female students(www.actabiomedica.it)

Key words: Dysmenorrhea, gynecology, adolescent medicine, epidemiology

Introduction

Dysmenorrhea is one of the most common gynecological disorders among adolescent girls. The syndrome of dysmenorrhea is known to encompass a wide variety of physical (and affective) symptoms (1-6). Dysmenorrhea can be divided into 2 broad categories of primary and secondary.

Primary dysmenorrhea (PD) is defined as recurrent, crampy pain occurring with menses in the absence of identifiable pelvic pathology. It is unusual for symptoms to start within the first six months after menarche. Affected women experience sharp, intermittent spasmodic pain usually concentrated in the suprapubic area. Pain may radiate to the back of the legs or the lower back. Mood changes, fatigue, headache, nausea and edema during menstruation are reported with dysmenorrhea (1-6). Negative consequences of dysmenorrhoea may include impaired quality of personal and social life, mood disorders, sleep disturbance and limitation of usual daily activities (3,4-6). Pain usually begins somewhere between several hours before and a few hours after the onset of the menstrual bleeding. Symptoms peak with maximum blood flow and usually last less than one day, but pain may continue up to 2 to 3 days (3,4-6). Symptoms are comparatively reproducible from one menstrual period to the other (1,2). Pain intensity may be mild, moderate or severe based the adolescent's description, degree of limitation of activities, and requirement for medication (1,2).

Secondary dysmenorrhea (SD) is menstrual pain associated with an underlying pelvic pathology such as endometriosis, pelvic inflammatory disease, congenital müllerian anomalies and ovarian cysts. Its onset may be many years after the onset of menarche (1,2,5). A variety of physiological, environmental and behavioural factors might influence SD. Early onset of menarche (7-9,12), smoking (8,10,11), higher body mass index (BMI) (12), null parity (13), longer and heavier menstrual flow (9,12,14) and family history of dysmenorrhea (15-17) are among these factors. Depression and stress increase the risk of dysmenorrhea (18). Physical exercise, fish intake and use of oral contraceptives are protecting. (8, 9,16). Other common factors, such as education and alcohol consumption show largely negative or inconclusive results (8,9,11,15). The association between dysmenorrhea and economic factors still need further research.

The exact cause of the disorder is not completely understood. However, there are many known factors that play significant roles in the pathogenesis of dysmenorrhea. The most important are: excessive uterine contractility, disturbances in uterine blood supply, increased synthesis of prostaglandins (PG) and anatomical abnormalities of the female reproductive tract (19-21). It was shown that women with dysmenorrhea have higher levels of PG in their plasma and menstrual effluent than women without dysmenorrhea (19-21). Most of the release of prostaglandins during menstruation occurs within the first 48 hrs, which coincides with the greatest intensity of the symptoms (22). PG stimulates myometrium contractility and local vasoconstriction that cause the menstrual effluent to be expelled from the uterine cavity. Additionally, elevated serum vasopressin, nitric oxide and interleukin-6 levels have been reported in women with PD (23-25). Moreover, increased lipid peroxidation and elevated concentrations of free radicals occur during dysmenorrhea (26-28).

Objectives

The main aim of this paper is to review the epidemiology of dysmenorrhoea in different countries, the methods used for the assessment of dysmenorrhea and its effect on this public health burden.

Methods

Published studies in English providing relevant information on dysmenorrhea were identified by searching PubMed, Embase and Google restricting the population to adolescents and young adult women and the year of publishing from 2010 to August 2015, based on the keywords 'dysmenorrhea', 'adolescents' and 'epidemiology'. In addition, the reference lists of the selected articles were examined. Only a limited number of studies have been included in this review, instead of a meta-analysis, because of the profound heterogeneity in study populations, definition of dysmenorrhea and measurements of risk factors among the included studies.

Prevalence of dysmenorrhea in different countries

We found 50 studies that met our inclusion criteria. The majority were cross-sectional studies on 41,140 adolescents and young women published from 2010 onward (Table 1).

Table 1. Summary of studies on dysmenorrhea in different countries from 2010 to 2015

References	Study characteristics and number of subjects	Prevalence and severity (%) of dysmenorrhea	Medical consultation and self-management (%)	Medical treatment
1. Parker M et al. (Australia) BJOG 2010;117:185–92	Questionnaire. 1,055 girls. Age range: 14 - 19 years.	93% Moderate: 48% and 21% severe pain		Self medication: 66% NSAIDs, followed by paracetamol and aspirin. 18% of girls taking pain medication were also taking a combined OCP.
2. Khamdan HY et al. (Kingdom of Bahrain) J Women's Health Care 2014; 3:5	Cross sectional study. 226 students. Mean age 21 years.	90.7%		Medication in 50.8%, while resting was the commonest practice by the students for most of the other symptoms
3. Haque SE et al. (Bangladesh) BMJ Open 2014;4:	Intervention study. 416 students aged 11–16 yrs.	Severe in 59.8%		
4. Pitangui AC et al. (Brazil) J Pediatr Adolesc Gynecol. 2013; 26: 148–52	Public school 218 adolescents aged:12-17 yrs.	73%		
5. Brito SA et al. (Brasil) J Nurs UFPE on line.2012;6:1386-94	Cross-sectional study. 634 students. 65,9 % - aged 18.2 yrs.	86% In 25.5 % of subjects the pain was mild, in 46.9 %, moderate and in 27.6 % was intense.		From the different methods used for pain relief, the most used was oral medication (47.8 %), followed by medicinal teas (16.0 %). Among the oral medications, the pharmacological class most used was NSAIDs. (24.6 %) followed by, antispasmodics (14.0 %) and analgesics (10%).
6. Zhou HG et al. (China) Health.2010;2: 311-4	Menstruation-related diary. 2,876 students. Mean age: 20.2 yr.	56.4% Mild: 64.7%; in28.8% moderate and in 6.5% severe		Medical treatment in 4.0% for mild, 13.3% for moderate and 23.7% for severe dysmenorrhea.
7. Nooh AM. (Egypt) Middle East Fertil Soc J. 2015; 20, 198–203	283 questionnaires. Mean age: 17.8±0.7 yrs.	65.4% 27.9%: mild; 23.3%: moderate and 14.1%: severe. PMS was mentioned by 158 students (55.8%)		

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References	Study characteristics and number of subjects	Prevalence and severity (%) of dysmenorrhea	Medical consultation and self-management (%)	Medical treatment
8. Makhlouf MME et al. (Egypt) AAMJ. 2010; 8:61–78	Descriptive study. 140 employees female.	20–25 years: 34.0 % ≥25 years: 66%	34.0%: 20–25 yrs. 66% ≥25 yrs.	
9. Eman MM. (Egypt) Life Sc J. 2012; 9: 348–353	Self-administered structured questionnaire. 845 adolescent school girls. Mean age 16.0 ± 1.5 years	76.1%. Mild: 26.6%; moderate 32.0% a nd severe 41.4%.	9% consulted a physician. 42% asked help to a school nurse	The majority of adolescents used non pharmacologic methods such as rest, heat, hot drinks, or sports.73% used pain medication without medical prescription.
10. Zegegne TK et al. (Ethiopia) BMC Public Health 2014, 14:1118–22	A mixed-method research combining quantitative and qualitative methods 562 students. Age range: 12 – 9 years, with a mean age of 14.96 (±1.33) yrs.	20.9 % severe		.
11. Shiferaw M et al. (Ethiopia) Pan Afr Med J. 2014 Apr 1; 17: 246.	Cross-sectional study. 470 subjects were randomly selected from faculties	85.1%		
12. Gagua T et al. (Georgia) J Turk Ger Gynecol Assoc. 2012;13:162–8.	Cross-sectional study including 2,561 women. Mean age 16±1.3 yrs.	52%		
13. Gumanga SK et al. (Ghana) Ghana Med J. 2012;46:3–7.	Cross-sectional descriptive study. 456 girls Age range: from 14-19 yrs ;mean age 16 ± 0.93 yrs.	74.4% Mild:18.1%; Moderate: 37.5% Severe: 18.8%.	3.3% consulted a physician.	Paracetamol was used by 51.5%. Other drugs: ibuprofen, aspirin or a spasmolytic or a combination of the above. 1% herbal drugs and 1% oral contraceptive pills.
14. Chia CF et al. (Hong Kong) Hong Kong Med J 2013;19:222–8	Cross-sectional questionnaire. 240 students. (128 medical and 112 non medical). Mean (±SD) age was 20.1±1.4 yrs.	80%	Only 6% sought medical advice. 70% practised self management.	Warm beverage (62%), paracetamol (57%), and sleeping (45%). The most effective strategies were non-steroidal anti-inflammatory drugs (100%), traditional Chinese medicine (93%), and dietary/ nutritional supplements (92%).

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15. Rani A et al. (India) Int J Adolesc Med Health. 2015 Feb 12. [Epub ahead of print]	Cross-sectional study. 300 girls Age range: 11-18 yrs.	61.3%	11.6%.	The practices were not optimal for pain management. Ten girls used hot water bottles and 71 skipped meals.
16. Kural M et al. (India) J Family Med Prim Care. 2015;4:426-31	Cross-sectional study. 310 girls (18-25 yrs).	84.2% In 34.2% severe pain, in 36.6% moderate and 29.2% mild .		
17. Kumbhar SK et al.(India) Nat J Comm Med.2011;2: 265-8	Two schools and 2 colleges. 183 girls (14-19 years).	65%		
18. Nirmala JL et al. (India) Sch J App Med Sci. 2014; 2:3165-75	Cross sectional study. 200 medical students. Age range: 17-22 yrs.	76% Mild to moderate degree in 46% and of severe degree in 30%		In 24% occasional use of analgesics.
19. Agarwal AK et al. (India). Indian J Community Med. 2010; 35: 159-64.	Explorative survey technique. 970 high school adolescent girls. Age range: 15-20 yrs.	71.9% 33.9% experienced dysmenorrhea every month.		
20. Shah M et al. (India). Healthline. 2013;4:30-4	Cross-sectional study. 116 students, Age range: 18-21 yrs.	48%.		
21. Charu S. et al. (India) Int J Collab Res Intl Med Pub Health, 2012;4:276-94	Cross sectional descriptive study 560 female medical students. Mean age: 20.5± 1yrs.	86.9 %		86.9% took treatment. Among these: 73.4% women took allopathic medicines; 168/270 took analgesics, 148/270 took antispasmodics and 46/270 took both). 57.8% had physiotherapy. 91 % used hot water bag, 19.8% (73/368) used home remedies.
22. Omidvar S. et al. (India). Am Med J-2012: 3: 8-13	Cross-sectional study. 500 healthy females, aged 18-28 yrs.	72.9%		

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23. Dambhare DG et al. (India) Glob J Health Sci. 2012; 4: 105-11	Cross-sectional descriptive study. 1100 school adolescent girls	56.1%	75.5% had discussed menstrual problems with someone, 38.1% with their mothers.	
24. Al Asadi JN et al. (Iraq) J Fac Med Baghdad 2013;55:339-44	Cross sectional study 384 students, mean age 17.1 yrs.	89.4% Moderate: 54.3%; severe: 43.9%	13.7 % Self-medication: 56.3%	Rest:56.9%; analgesics:23.6%; herbal remedies:18.5% and hot pads: 7.3%
25. Baghianimoghadam MH. (Iran) JCHR. 2012;1: 93-8	Cross-sectional study. 300 students of university. Age range of participants: 18 – 35 years (mean: 21±4.3 yrs).	38.1%		In 66%: "calmative drugs" .
26. Zannoni L et al. (Italy).J Pediatr Adolesc Gynecol. 2014; 27:258-65	Cross-sectional study. 250 adolescents Age range: 14–20 yrs.	68% 12% lose days of school/work monthly because of pain		
27.De Sanctis V et al. (Italy) Indian J Endocr Metab. 2014 18, Suppl S1: 84-92	Cross-sectional multicenter study. 4,992 girls (mean age: 17.1 yrs).	56% In 56% subject it was severe		42%
28. Nohara M et al. (Japan) Ind Health. 2011;49:228-34.	Anonymous self-administered questionnaire 2,166 women. 10.4 % < 25 yr.	77.6% 2.8% of female workers responded that they have "very serious pain" , 25.8% "serious pain" , and 49.7% responded that "the pain could be tolerated".	The study showed that menstrual pain was related to stress, high temperature and humidity, age, BMI, and number of births. 64.8% with "severe pain" consulted a gynecologist, while 82.3% of those with "moderate pain" and 42.5% of those to "tolerable pain" did ask for treatment.	
29. Nagata C et al. (Japan) Eur J Clin Nutr. 2005; 59: 88–92	Questionnaire. 276 Japanese women, aged 19–24 yrs.	Mild: 40.2%; moderate: 34.4%; severe: 8.7%.		

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References	Study characteristics and number of subjects	Prevalence and severity (%) of dysmenorrhea	Medical consultation and self-management (%)	Medical treatment
30. Kazama M et al. (Japan) Tohoku J Exp Med. 2015;236:107–13	Cross-sectional study. 1,018 girls aged between 12 and 15 years.	46.8% Severe in 17.7%		
31. Bata MS . (Jordan) Int J Gynaecol Obstet. 2012; 119:281–3.	Self-administered questionnaire. 596 secondary-school students. Mean age:15.7 ± 1.5 yrs.	Mid-cycle pain was reported by 30.9% and dysmenorrhea by 37.6% of the students		
32. Al-Jefout M et al. (Jordan). J Pediatr Adolesc Gynecol. 2015;28:173–85.	Cross-sectional study. 272 female medical students (aged 19–25 years).	In 55.8% from moderate to severe	Mothers were the main source of information	In 69.4%: analgesics.
33. Lee JC et al. (Korea). Korean J Pediatr.2011; 54:201–6	Anonymous questionnaire 538 teenage girls, aged 14 to 18 yrs (mean age, 16.1 yrs.	82% Severe in 0.9% of subjects		Painkillers were not needed in 65.6%.
34. Wong LP. (Malaysia) Aust J Rural Health. 2011 ;19:218–23	Cross-sectional study. 1,295 adolescent girls (aged 13–19 yrs) of a rural school	76.0%	14.8% sought medical treatment. The majority obtained information from their mothers (62.3%) and peers (52.9%).	
35.Wong LP et al. (Malaysia) Int J Gynaecol Obstet. 2010;108:139–42.	Cross-sectional study. 1,092 girls from 15 public secondary schools and 3 ethnic groups	74.5%	12% had consulted a physician and 53.3% did nothing about their conditions.	
36. Al-Kindi R and Al-Bulushi A. (Oman) SQU Med J. 2011,11:485–91	Cross-sectional survey. 404 girls from two public high schools. Age range:15–23 yrs.	94% Mild : 27% ; Moderate: 41% ; Severe: 32%	3% 21% self-medicated	Paracetamol 16%; ibuprofen 8% and mefenamic acid 12,3%.
37. Saadia Y. (Pakistan) J Ayub Med Coll Abbottabad 2014;26:349–52	Cross-sectional survey. 356 female medical students. Mean age 21 years.	56.1%	4% consulted a physician. 96% self-treated either pharmacologically or non-pharmacologically.	Household remedies were used by 43% of the students. Paracetamol was used by 26%, aspirin by 15%, ibuprofen by 15%, diclofenac sodium by 10%, mefenamic acid by 26% and combination of analgesic by 8% of the participating students.

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38. Gulzar et al. (Pakistan) Int J Innov Res Develop.2015;4:236-40	Cross-sectional descriptive study. 337 school and college going female students aged between 12-19 years.	78%.	Most of the participants, 74 (80.4%), preferred to get analgesics prescribed by the physicians	Ponstan was the most commonly used analgesic; 29 (31.5%). Panadol was used by 18 (19.5%) participants and Buscopan, was taken by 29 (31.5%).
39. Rodrigues AC et al. (Portugal) Acta Med Port. 2011; 24 Suppl 2:383-88	Observational transversal study. 274 adolescents and young adults (age ≤26)	62.8%	The intensity of pain led to the search for health care.	The reported for pain treatment included NSAID's (38.5%). and oral pills (37.0%).
40. Kakoma JB et al. (Rwanda) Rwanda Med J.2010; 68: 25-31	Questionnaire. Students (N=466): 23.7 ± 2.8 yrs School girls (N=423) :19.8 ± 2.9 yrs	77.3% (Students) and 85.6 % (School girls).		Analgesics (39.4%); nonsteroidal anti-inflammatory drugs (38.8 %); aspirin 3.8%; antispasmodics;
41. Bano R et al. (Saudi Arabia) IJHSR.	Cross-sectional descriptive study using self-administered questionnaire. 100 participants.	Mild: 20%; moderate: 43%, and severe in 37%.		
42. Wijesiri HS et al. (Sri Lanka) Nurs Health Sci. 2013;15:58-64.	Age range :18 - 24 yrs. A descriptive study. 200 adolescent students.	84%		Paracetamol was the drug of choice for pain relief.
43. Narring F et al. (Switzerland) Arch Pediatr. 2012;19:125-30.	Cross sectional survey. 3,340 females, aged 16 to 20 yrs who attended post-mandatory education	86.6% In 12.4% : severe dysmenorrhea and in 74.2% moderate dysmenorrhea.	Fewer than half have consulted a physician	Fewer were treated properly.
44. Pembe AB and Ndolele NT. (Tanzania) East Afr J Public Health. 2011;8:232-6.	Cross sectional study. 880 girls of eight secondary schools.	74.1% Adolescents who missed school due to dysmenorrhoea were 154 (23.6%) and 140 (21.5%) missed social activities.		55.5 % paracetamol and diclofenac.

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References	Study characteristics and number of subjects	Prevalence and severity (%) of dysmenorrhea	Medical consultation and self-management (%)	Medical treatment
45. Eryilmaz G et al. (Turkey) J Pediatr Adolesc Gynecol. 2010;23:267–72.	Descriptive study (26 high schools). 1,951 adolescents, aged 13 to 18 yrs.	68.1-72.2%		
46. Sahin S et al. (Turkey) Gynecol Obstet Invest.2014;78:179–85	The study group included 520 students. Mean age of the students was 20.2 ± 1.5 years (range 17-25).	69 % Frequency of dysmenorrhea was higher in smokers, those with menstrual irregularity, those who used drugs for menstrual regulation and those having a family history.		
47. Unsal A et al. (Turkey) Ups J Med Sci. 2010;115:138–45	Cross-sectional study. 623 female students. The average age of the study group was 20.8 +/- 1.8 years (range 17-30).	72.7%		
48. Potur DC et al.(Turkey) Pain Manag Nurs. 2014;15: 768–77	Cross-sectional study. 1,515 University students.	85.7% Severe in 30.4%; in 49.8% moderate and in 19.8% mild	Participants with severe pain consulted a physician	Analgesics Participants who experienced moderate pain used herbal tea, massage, heat application, rest and distraction for pain management.
49. Seven M et al. (Turkey) Pain Manag Nurs. 2014;15:664–71	Questionnaire 380 students. Mean age: 20.3 years.	84.9%		
50. Jang IA et al.(Vietnamese women living in South Korea) Obstet Gynecol Sci. 2013; 56: 242-8	Questionnaires. 3,017 Vietnamese women, aged 17 to 42 yrs (mean; 25.5 yrs).	58.8% Mild to moderate: 7.8% Moderate: 65.9% Moderate to severe: 23.3 % Severe: 2 %		

The prevalence of dysmenorrhea varied greatly from 94% (Oman), 59.8% (Bangladesh), 34% (Egypt) (Table 1, no. 8 and 36) to 0.9% (Korea) (Table 1, no. 3 and 33).

Menstrual pain frequently occurred on the first day of menstruation (77.8%) (Table 1, no. 49). Mid-cycle pain was reported by 30.9% and 33.9% experienced dysmenorrhea every month (Table 1, no. 31 and 19). 42.6% of students showed menstrual cramps lasting between 24 and 48 hours (Table 1, no. 5).

The most common dysmenorrhea symptoms were abdominal cramps (53.2%), low-back pain (34.2%) and fatigue (21.6%) (Table 1, no.28). The most common associations were nervousness and depression (70%), followed by sleeplessness (50%) and headache (42%). Nausea and vomiting were observed only in 15% of adolescents. (Table 1, no. 41). Some participants had dysuria with the dysmenorrhoea and hence they felt reluctant to pass urine (Table 1, no. 13).

Review of methods used for the assessment of dysmenorrhea

In the present literature review, two instruments were mainly used to measure the participants' severity of dysmenorrhoea: Multi dimensional Scoring system (MSS) and a Visual Analog Scale (VAS). The first scoring system measured pain severity and took into account the impact of pain on daily activities, systemic symptoms and analgesic requirements.

The MSS grading of pain is as follows:

Grade 0: Menstruation is not painful and daily activities are not affected.

Grade 1 (mild): Menstruation is painful but seldom inhibits normal activity. Pain killers are rarely required.

Grade 2 (moderate): Menstruation is moderately painful and it affects daily activities. Pain killers are required; however they give sufficient relief so that absence from class is unusual.

Grade 3 (severe): Menstruation is extremely painful and associated with vegetative symptoms (headache, fatigue, vomiting and diarrhea). Daily activities are clearly inhibited. Pain killers provide no relief.

VAS was assessed with a linear analogue scale. This scale involves the use of a 10 cm line on a sheet of paper and represents the girls' continuum of severity of pain beginning with " no pain at all" and ending with "unbearable pain." The participants were asked to rate the degree of pain by making a mark on line. The scores obtained 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. Participants were instructed to evaluate their pain for the 6 menstrual days (Table 1, no. 49).

Dysmenorrhea was found to be significantly associated with older age, earlier menarche, irregular or long cycle and heavy bleeding (Table 1, no. 9). However, in one study no significant correlation was found between age at menarche and severity of dysmenorrhea (Table 1, no. 41).

One study reported that menstrual pain was related to stress, high temperature and humidity, age, BMI and number of births (Table 1, no. 28). The correlation between age and various degrees of dysmenorrhea was found to be statistically significant (χ^2 =5.32; p < 0.05). The highest percentage of the participants (32%) were 21 years of age followed by 20 years (29%) and than 22 years (16%) (Table 1, no. 41).

About 50% of students (53.7%-47.4%) reported a family history of dysmenorrhea (Table 1, no. 16, 24,28,33 and 46). When logistic regression analysis was done, the risk of dysmenorrhea was 0.97 times lower as age increased (p <0.006) (Table 1, no. 50).

In another study, univariate logistic regression analysis showed that eating chocolate, using oral contraceptive pills, age at first menstruation, menstrual frequency, and sister's dysmenorrhea status affected participants' dysmenorrhea status (p<0.05). The multivariate logistic regression model showed that those whose sister experienced dysmenorrhea were 0.2 times more likely to experience dysmenorrhea themselves than those whose sister did not have dysmenorrhea, and this finding was statistically significant (Table 1, no. 49).

Certain diets may cause an increase in the symptoms and in the intensity of menstrual discomfort. The severity of dysmenorrhea was significantly correlated with daily meal pattern and the total daily protein intake (p<0.05) (Table 1, no.41). A good protein intake can help to reduce the symptoms of dysmenorrhea.

Morbidities associated to dysmenorrhea

Adolescents who missed school due to dysmenorrhoea were from 7.7% to 57.8% (Table 1, ref. 3, 10) and 140 (21.5%) missed social activities (Table 1, no. 44).

School absenteeism was due to lack of class concentration during their period 209 (79.4%), poor class attendance 72 (27.3%) and concentration on pain 52 (19.7%).

During menstruation days students didn't come to school or even if they came, they didn't attend class attentively thinking of the sudden leakage or the pain associated with menstruation. They didn't come to school even if they have an exam or didn't do the test with concentration when menstruation days coincided with exam days.

They didn't stand in front of students to answer questions or to write on the board fearing the sudden leakage of blood and staining of their clothes (Table 1, no. 10).

Academic performance was affected by menstruation in several ways; mainly study time (76%), concentration (65.8%), participation in group activities (58.1%), examination performance (51.8%) and class attendance (40.8%) (Table 1, no. 2).

Some participants could not undertake their normal activities during the pain, they became irritable and were not able to relate well with friends and family. Over half (53.6%) of the students preferred to be alone, 2.7% became more sociable and the social life of the remaining (43.7%) was not affected during menstruation (Table 1, no. 2 and 40).

Furthermore, short sleeping hours (< 6/day) were associated with moderate-severe dysmenorrhea (OR = 3.05, 95%CI: 1.06-8.77), and sports activity levels were associated with severe dysmenorrhea (p for trend= 0.045) (Table 1, no.30). Sleep disturbance (26%) was also observed in 26% of University students in Hong Kong (Table 1, no. 14).

Only 79 girls (32%) had a bath on the first day of their menstrual period. Furthermore, 162 girls (65%) did not have a bath in the early days of their menstruation cycle, out of which 85 girls (51.5%) did not have a bath even after eight days from the beginning of their menstrual period (Table 1, no. 38).

Dietary intake changed in 73.9% of the students with almost equal proportions reporting eating more (36.4%) and eating less (37.3%). There was a high tendency to eat more chocolate (59.4%) and other sweets (43.9%) while consumption of savouries, soft drinks, tea/coffee, dairy products and junk food were not that affected (Table 1, no. 2).There were statistically significant differences by medical year for the intake of chocolate and soft drinks only. The proportions of students increasing their chocolate intake during the menstrual period were 61.5% (year 1), 54.1% (year 2), 60.0% (year 3), 70.7% (year 4), 38.2% (year 5) and 68.4% (year 6). For soft drinks, the corresponding percentages were 28.9%, 16.2%, 14.7%, 15.4%, 6.2% and 10.8%, respectively (Table 1, no. 2).

Pre-menstrual syndrome

Dysmenorrhoea (76%), premenstrual symptoms (PMS, 69%) and irregularity of cycles (29%) were the most frequent menstrual abnormalities observed in one study. The duration of pre-menstrual syndrome was 1.5± 0.7 days (Table 1, no. 18).

The increase in BMI was shown in a study to have a highly significant association with PMS (p< 0.001). This study also showed a highly significant association between physical activity and PMS (p: 0.01) (Table 1, no. 7).

The duration of pre-menstrual syndrome was 1.5± 0.7 days. The students were questioned regarding work days lost due to dysmenorrhoea and 50 (25%) reported losing 1.5±1.0 days (Table 1, no. 49).

Reported treatment of dysmenorrhea

Despite the high prevalence of dysmenorrhea in adolescents, many girls did not receive professional help or treatment (Table 1). Mothers were the most important persons the girls turned to for answers regarding menstruation, followed by peers (52.9%) and school nurse (Table 1, no. 9 and 34).

Wong and Khoo in their study reported that in spite of the high prevalence and enormous impact of dysmenorrhea on the lives of participants, 76% be-

lieved that dysmenorrhea was a normal part of the female menstrual cycle and only 14.8% sought medical treatment (Table 1, no. 35). This suggested that culture may influence the experience and interpretation of symptoms such as pain and the way in which they are treated.

Several remedies were used to reduce pain and duration of dysmenorrhea. Household remedies were used by 43% of the students (Table 1, no. 37). Methods such as herbal remedies, traditional Chinese medicine, hot drinks, or sports, herbal tea, coffee, physiotherapy massage, heat application, rest and distraction for pain management have been also reported (Table 1, no. 5, 9, 14, 21, 24, 37, 41 and 48). From 21% to 96% practised self-medication either by pharmacological or non pharmacological interventions (Table 1, no. 14, 24, 37). The most common strategies reported were resting (65.1%), taking an analgesic (54.6%), locally applying heat packs (63.2%), drinking herbal tea (32.2%), taking a hot shower (37.1%), and walking (21.6%). On the other hand, 19.1% applied to an emergency department (Table 1, no. 49). When dysmenorrhea was severe, analgesics, nonsteroidal anti-inflammatory drugs (NSAID), aspirin, antispasmodics or "calmative drugs" were used by a high proportion of subjects. However, only few girls reported seeking medical advice (Table 1, no. 9, 13, 14, 15, 24, 34, 35, 37 and 43). The use of oral contraceptives for menstrual problems was minimal. Medication dosing was often sub-therapeutic.

Effect of the analgesics used on menstrual blood flow was studied. One hundred and seventy-seven (88.5%) of the students reported no effect on blood flow, 22 (11%) had decreased blood and 1 (0.5%) reported increase in blood flow when using aspirin as a pain-killer.

Discussion

Morbidity due to dysmenorrhea represents a substantial public health burden because it is one of the leading causes of absenteeism from school and work and is responsible for significant loss of earnings and diminished quality of life (29-34).

A number of recent studies have determined the prevalence of dysmenorrhoea with estimates ranging from 20-90%, probably depending on variable methods of data collection, different definitions of dysmenorrhea and diverse study populations (Table 1). The wide prevalence variation may also be due to the focus on selected groups of subjects instead of a representative sample from the population of women in the local community (35, 36).

The limitation of these studies was that they did not distinguish between PD and SD, and most of the them did not evaluate the degree of menstrual pain (37,38). In approximately 10% of adolescents and young adults with severe dysmenorrhea pelvic abnormalities such as endometriosis or uterine anomalies were found.

Adolescents received information regarding menstruation from variable sources. Mothers were the major source while only few received information about menstruation and related symptoms from their healthcare providers. Therefore, it has been recommended that adolescent care providers should be able to care for these girls in a more efficient way (39-42).

In our survey, many adolescent girls self-medicate with paracetamol or NSAIDs. Some girls even go to the extent of using these medications in nontherapeutic doses for quick pain relief. The negative aspect of self-medication is that most people are not cognizant of the side effects and it is also possible that correct dosage may not be used.

Appropriate counselling and management should be instituted among female students to help them cope with the challenges of dysmenorrhea. Information, education and support should also be extended to parents, school peer leaders, and hostel administrators in order to address the reproductive health needs of the female students.

In summary, studying the epidemiology and natural progression of menstrual pain is an interesting issue that deserves further attention because of its high prevalence and possible significant negative consequence on women health.

In order to reach this goal, the following recommendations have been reported in the literature:

• Dysmenorrhea is one of the most common complaints among adolescents and women of young reproductive age. Morbidities, including school absenteeism, are higher among those with severe

dysmenorrhea. Since only 2% of adolescents received information regarding menstruation from their health care provider, it is imperative that health care providers increase their anticipatory guidance regarding normal menstruation. This may aid in the prompt diagnosis and treatment of menstrual disorders to minimise the impact on school, sports, social and daily activities and decrease their associated morbidities (30,42).

- Earlier age at menarche, long menstrual periods, heavy menstrual flow, smoking, positive family history, obesity and alcohol consumption are associated with more severe episodes of dysmenorrhea. Therefore, lifestyle modifications and promoting healthy eating habits should be highlighted in school health education programs to improve menstrual health (9,43)

- Information, education and support should also be extended to parents in order to address the reproductive health needs of the female students (44).

- Clinicians need to identify menstrual abnormalities as early as possible in order to minimize their possible consequences and to promote proper management (48,49). We recommend encouraging adolescents to chart their menstrual frequency and regularity prospectively from menarche onwards (45,46).

- Those adolescents who do not respond to simple medical management should be considered for further investigation for possible underlying pathology, such as endometriosis (47).

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