



Primary dysmenorrhea among Mexican university students: prevalence, impact and treatment

Mario I. Ortiz*

Laboratorio de Farmacología, Área Académica de Medicina del Instituto de Ciencias de la Salud, Universidad Autónoma del Estado de Hidalgo, Eliseo Ramírez Ulloa 400, Col. Doctores, Pachuca, Hidalgo 42090, Mexico

ARTICLE INFO

Article history:

Received 27 August 2009

Received in revised form 6 April 2010

Accepted 26 April 2010

Keywords:

Dysmenorrhea

Prevalence

Medication

Self-medication

Impact

School absenteeism

Mexican university students

ABSTRACT

Objective: To evaluate the prevalence, impact and treatment of primary dysmenorrhea among Mexican university students.

Study design: A multiple-choice questionnaire was administered to 1539 students in six university programs: medicine, nursing, nutrition, dentistry, pharmacy and psychology. Data on the presence, severity, symptoms, treatment and limitations caused by dysmenorrhea were obtained and analyzed. **Results:** The mean \pm SD age of the women was 20.4 ± 2.0 years; the mean age of menarche was 12.3 ± 1.5 years. A total of 64% of the women experienced dysmenorrhea. Dysmenorrhea was more prevalent among nutrition and psychology students than among medicine, pharmacy and dentistry students ($p < 0.05$). Dysmenorrhea was mild in 36.1% of women, moderate in 43.8% and severe in 20.1%. Nursing students showed an intensity of pain that was significantly higher than that of medicine and dentistry students ($p < 0.05$). Sixty-five percent of the women with dysmenorrhea reported that it limited their daily activities, and 42.1% reported school absenteeism (SA) as a result. Of those who experienced dysmenorrhea, 25.9% consulted a physician, and 61.7% practiced self-medication (SM). The most common medications used were an over-the-counter (OTC) medication with paracetamol (an analgesic), pamabrom (a diuretic), and pyrilamine (a histamine antagonist), another OTC with metamizol (a non-steroidal anti-inflammatory drug [NSAID]) plus butylthioscine (an antispasmodic drug) and naproxen (a NSAID). Of those women using prescribed medications, 18.4% reported complete remission of their symptoms, while 78.1% reported little to moderate alleviation, and 3.6% reported no effect on their menstrual distress. Similarly, of the women who practiced SM, 23.4% reported complete relief, 75.5% reported little to moderate effectiveness, and 1.0% reported no efficacy.

Conclusion: The prevalence of dysmenorrhea among Mexican university students is high, and the pain that these women suffer can be severe, disabling and result in short-term SA. The pain is often not completely relieved despite the use of medication. It is necessary to improve the therapeutic options for relief of pain caused by dysmenorrhea and to minimize the impact of dysmenorrhea on social, economic and school activities.

© 2010 Elsevier Ireland Ltd. All rights reserved.

1. Introduction

Dysmenorrhea refers to cyclic lower abdominal or pelvic pain occurring just before and/or during menstruation. Primary dysmenorrhea is highly prevalent among adolescent girls. Depending on the measurement used, 20–90% of young girls report dysmenorrhea [1–4]. It is estimated that more than 10% of adolescent girls suffer from severe dysmenorrhea, which is the leading cause of recurrent short-term school absenteeism (SA) in this population [1–4]. Dysmenorrhea is thought to be caused by the release of prostaglandins into the uterine tissue; these

prostaglandins cause contractions and pain [1,5,6]. Non-steroidal anti-inflammatory drugs (NSAIDs) are the established initial therapy for dysmenorrhea [1,6–8]. Only a small number of adolescents with dysmenorrhea seek help from physicians [8–10], and self-medication (SM) is a common practice among these adolescents [8,11,12].

Recently, our group evaluated the factors affecting the prevalence of dysmenorrhea in a group of Mexican high school students [8]. We found that 48.4% of the students experienced dysmenorrhea. Of these students, 32.9% reported mild pain while 67.1% reported moderate to severe pain. Twenty-four percent of dysmenorrheic students reported SA and 60.9% practiced SM. However, dysmenorrhea has a strong impact not only on teenagers, but also on adult women who are dedicated to work or study, such as women attending universities. A recent study in Turkish university students

* Tel.: +52 77 1717 2000x4510; fax: +52 77 1717 2000x4510.

E-mail address: mario_i_ortiz@hotmail.com.

showed a dysmenorrhea prevalence of 87.8%, with 39.4% of women reporting SA and 66.9% reporting SM [13]. Nevertheless, this prevalence appears to be higher than that of 55.5% reported among students of a different university in Turkey [14]. Similarly, a study in Malaysian medical and dental university students reported an overall dysmenorrhea prevalence of 50.9%; this study found that those with menstrual distress were more severely affected in terms social activities, SA and normal daily life than those without dysmenorrhea [15]. Another recent study of Nigerian university women reported a dysmenorrhea prevalence of 84.9% and found that about half of the students reported that menstrual pain interferes with their daily scholarly activity [16]. An investigation of Mexican nursing students found that 90% experienced dysmenorrhea; 20.8% of these women reported severe symptoms, and 61.7% practiced SM [17]. Regrettably, this last study of Mexican university students did not evaluate several important aspects of the problem, including access to formal medical care (AFMC), pharmacologic treatment, the effectiveness of medications, the beginning and duration of symptoms, and limitations on daily activities. With these aspects in mind, the objective of the present study was to investigate the prevalence, impact and treatment of dysmenorrhea in a sample of Mexican university students pursuing studies related to six different careers.

2. Materials and methods

This cross-sectional study was conducted between January 2007 and December 2007. The study protocol was approved by the Servicios de Salud de Hidalgo, Pachuca, Hidalgo, Mexico and the work was performed in accordance with the Declaration of Helsinki. A total of 1539 female students at the university completed an anonymous multiple-choice questionnaire administered at the Instituto de Ciencias de la Salud of the Universidad Autónoma del Estado de Hidalgo, Pachuca, Hidalgo, Mexico. This institute offers six different university courses of study: medicine, nursing, nutrition, dentistry, pharmacy and psychology. The institute obtained consent from all participants, and their anonymity was assured. The 38-item questionnaire [8,9] included a brief definition of dysmenorrhea and asked for information concerning demographics, pregnancy, parity, pain with menstruation and its severity. Additional questions related to the frequency

and severity of symptoms, changes in daily activities, SA, AFMC, prescription drug use, over-the-counter (OTC) medication and SM. Medication effectiveness was evaluated using a categorical rating scale [8]. Dysmenorrhea was defined as “having painful menstruation during the previous 3 months” and the degree of pain was assessed by a 100 mm visual analog scale (VAS) ranging from “no pain” to “the worst pain imaginable” [8].

Data were entered into a computerized database. SPSS version 17 for Windows (SPSS Inc., Chicago, IL, USA) was used for descriptive and inferential statistical analyses. We performed exploratory analysis using the Student's *t* test and the Pearson Chi-square test. AFMC and SM were analyzed with logistic regression analysis. AFMC and SM were considered to be dependent variables, while an inability to participate in daily activities, the beginning of symptoms and the severity of dysmenorrheic pain were potential predictors. For the multivariable analysis, we used stepwise logistic regression analysis. The significance level was set at $p < 0.05$.

3. Results

A total of 1539 women who volunteered for the study completed the multiple-choice questionnaire. The mean \pm SD age of all the women was 20.4 ± 2.0 years (range 17–35). The mean age of menarche was 12.3 ± 1.5 years (range 9–19). Only 56 women reported having children.

Of the 1539 women, 961 (62.4%) reported having experienced dysmenorrhea, while 578 (37.6%) reported not having experienced dysmenorrhea. There was a significant difference ($p < 0.001$) between the ages of the dysmenorrheic women (20.5 ± 2.0 years; range 17–35) and the ages of women who were not dysmenorrheic (20.1 ± 1.98 years; range 17–33). Likewise, there was a statistically significant difference ($p = 0.004$) between the mean ages of menarche; the mean age in the dysmenorrheic group was 12.2 ± 1.4 years (range 9–19) while the mean age in the group without dysmenorrhea was 12.5 ± 1.5 years (range 9–18). The prevalence of dysmenorrhea among the university students participating in the study is shown in Table 1. Nutrition and psychology students had a significantly higher prevalence of dysmenorrhea than students in medicine, pharmacy and dentistry ($p < 0.05$). Of all students experiencing dysmenorrhea, 36.1% reported mild pain, 43.8% reported moderate pain and 20.1% reported severe pain. Table 2 shows the VAS mean pain scores and

Table 1
Characteristics of women with and without dysmenorrhea who participated in the study ($n = 1539$).

	Dysmenorrhea, <i>n</i> (%)	Without dysmenorrhea, <i>n</i> (%)	<i>p</i> -Value
Nutrition (nut)	161 (70.0)	69 (30.0)	vs. med, pha and den < 0.05
Psychology (psy)	191 (67.0)	94 (33.0)	vs. den < 0.05
Nursing (nur)	123 (66.5)	62 (33.5)	vs. den < 0.05
Medicine (med)	307 (60.4)	201 (39.6)	vs. others > 0.05
Pharmacy (pha)	46 (55.4)	37 (44.6)	vs. others > 0.05
Dentistry (den)	133 (53.6)	115 (46.4)	vs. others > 0.05

Table 2
VAS scores and intensity of pain in the dysmenorrheic women ($n = 961$).

	VAS scores		Pain			<i>p</i> -Value
	Mean (\pm SD)	<i>p</i> -Value	Severe Mean (\pm SD)	Moderate Mean (\pm SD)	Mild Mean (\pm SD)	
Nursing (nur)	60.0 (24.5)	vs. med, den < 0.05	89.5 (9.5)	57.5 (8.8)	30.8 (10.9)	vs. med, den < 0.05
Nutrition (nut)	54.5 (23.2)	vs. others > 0.05	86.8 (8.5)	60.4 (8.8)	30.6 (11.1)	vs. others > 0.05
Psychology (psy)	53.9 (23.4)	vs. others > 0.05	87.1 (9.5)	57.8 (7.8)	29.3 (11.1)	vs. others > 0.05
Medicine (med)	52.3 (23.1)	vs. others > 0.05	87.0 (10.0)	59.7 (8.8)	27.9 (11.4)	vs. others > 0.05
Pharmacy (pha)	56.0 (19.3)	vs. others > 0.05	82.9 (7.8)	57.3 (8.8)	33.1 (5.7)	vs. others > 0.05
Dentistry (den)	51.8 (23.6)	vs. others > 0.05	85.8 (8.2)	59.2 (8.4)	28.2 (11.4)	vs. others > 0.05
All groups	54.1 (23.4)		87.1 (9.2)	59.0 (8.6)	29.2 (11.1)	

Table 3
Characteristics of symptomatology in dysmenorrheic women.

	n	(%)
Symptomatology		
Cramping pain in the lower abdomen	894	(93.0)
Swollen abdomen	648	(67.4)
Irritability	480	(49.9)
Depression	465	(48.4)
Painful or tender breasts	436	(45.4)
Backache	414	(43.1)
Gastrointestinal disturbances	254	(26.4)
Headache	230	(23.9)
Swelling legs	178	(18.5)
Beginning of the symptomatology		
1–2 days before menses	245	(25.5)
First day of menstruation	444	(46.2)
2–3 days after menses	272	(28.3)
Incapacitating		
30 min	120	(19.2)
31–60 min	213	(34.1)
61–180 min	181	(29.0)
>3–6 h	39	(6.2)
>6–24 h	58	(9.3)
>24 h	14	(2.2)

intensity of pain reported by students in different careers. The intensity of pain and VAS mean pain scores of nursing students was significantly higher than those reported by medicine and dentistry students ($p < 0.05$).

The most common symptoms of menstrual distress and descriptions of the beginning and duration of the symptoms are shown in Table 3. About two-thirds of women (625 women, 65%) reported that dysmenorrhea limited their daily activities in 4.2 ± 2.9 menstrual cycles per year; 263 (42.1%) of these 625 women reported SA in 3.1 ± 2.2 menstrual cycles per year. Table 3 illustrates the characteristics of this inability to participate in daily activities. Psychology and nutrition students reported significantly greater limitations of daily activities due to dysmenorrhea than did medicine students ($p < 0.05$, Table 4). A statistical analysis of school absenteeism did not show statistically significant differences between any of the careers ($p > 0.05$, Table 4).

Only 249 (25.9%) of the students consulted a physician for their dysmenorrhea in 2.9 ± 1.97 cycles per year; 78.7% of these students used a medical prescription. Table 5 shows the AFMC of the students.

Table 4
Limitation of daily activities and school absenteeism in the dysmenorrheic women ($n=961$).

	Limitation of daily activities		School absenteeism	
	% (Woman)	p-Value	% (Woman)	p-Value
Psychology (psy)	70.2 (134)	vs. med < 0.05	42.5 (57)	vs. others > 0.05
Nutrition (nut)	70.2 (113)	vs. med < 0.05	46.9 (53)	vs. others > 0.05
Pharmacy (pha)	69.6 (32)	vs. others > 0.05	40.6 (13)	vs. others > 0.05
Nursing (nur)	66.7 (82)	vs. others > 0.05	47.6 (39)	vs. others > 0.05
Dentistry (den)	60.9 (81)	vs. others > 0.05	39.5 (32)	vs. others > 0.05
Medicine (med)	59.6 (183)	vs. others > 0.05	37.7 (69)	vs. others > 0.05

Table 5
Access to formal medical care and self-medication in the dysmenorrheic women ($n=961$).

	Access to formal medical care		Self-medication	
	% (Woman)	p-Value	% (Woman)	p-Value
Psychology (psy)	33.5 (64)	vs. med < 0.05	64.9 (124)	vs. nur, den < 0.05
Pharmacy (pha)	30.4 (14)	vs. others > 0.05	54.3 (25)	vs. others > 0.05
Nursing (nur)	28.5 (35)	vs. others > 0.05	50.4 (62)	vs. others > 0.05
Dentistry (den)	25.6 (34)	vs. others > 0.05	51.9 (69)	vs. others > 0.05
Nutrition (nut)	24.8 (40)	vs. others > 0.05	67.7 (109)	vs. nur, den < 0.05
Medicine (med)	20.2 (62)	vs. others > 0.05	66.4 (204)	vs. nur, den < 0.05

Psychology students sought medical help significantly more frequently than medicine students ($p < 0.05$). The most common prescriptions were the OTC medication Syncol (19.4%, paracetamol, pamabrom and pyrilamine), naproxen (11.7%), and another OTC, Buscapina compositum (10.7%, metamizol plus butylhioscine bromide) (Table 6). A statistical analysis of the effectiveness of these three medicines did not reveal significant differences between them ($p > 0.05$). In our study, only 18.4% of students using a prescribed medication reported the complete remission of symptoms; 38.3% reported moderate relief, 39.8% reported little alleviation and 3.6% reported no effect on menstrual distress.

SM was practiced by 593 (61.7%) of the students with dysmenorrhea in 6.0 ± 3.6 cycles per year. Table 5 shows the SM patterns of students in different courses of study. Nutrition, medicine and psychology students practiced SM significantly more frequently than nursing and dentistry students ($p < 0.05$). Of the women who practiced SM, 23.4% reported that it was completely effective, 43.0% reported moderate effectiveness, 32.5% reported little effect and 1.0% reported no effect. The most common medications used for SM were Syncol (35.2%), naproxen (16.5%), Buscapina compositum (14.0%) and paracetamol (Table 6). A statistical analysis of the effectiveness of the medicines used demonstrated that paracetamol was reported to be more effective in alleviating the pain than Syncol ($p = 0.017$) or butylhioscine bromide ($p = 0.023$). On the other hand, the analysis did not show significant differences among the remaining medicines ($p > 0.05$).

Table 7 shows the results of the logistic regression analysis. Several variables predicted AFMC ($p < 0.05$): incapacity in daily activities, the beginning of symptoms and the severity of dysmenorrheic pain. Only two variables, incapacity in daily activities and the severity of dysmenorrheic pain, predicted SM ($p < 0.05$).

4. Discussion

The prevalence of menstrual pain (62.4%) in the participants in this study corresponds to the findings of Pedrón-Nuevo et al. [11], who reported that the general prevalence of dysmenorrhea among students from Mexico City was 56%. However, the prevalence found in our study appears to be higher than the 28% reported for a Mexican Mayan rural community population [10] and the 48.4% reported for Mexican high school students [8]. Likewise, the 66.5% prevalence found in the group of nursing students in our study

Table 6
Drugs used for prescription (196 patients) and self-medication (593 patients).

	Prescription, (%) n	Self-medication, (%) n
Paracetamol, pamabrom and pyrilamine maleate	19.4 (38)	35.2 (209)
Naproxen	11.7 (23)	16.5 (98)
Metamizol plus butylhioscine bromide	10.7 (21)	14.0 (83)
Butylhioscine bromide alone	10.2 (20)	7.8 (46)
Ibuprofen	8.7 (17)	4.7 (28)
Paracetamol	6.1 (12)	9.6 (57)
Mefenamic acid	4.6 (9)	1.2 (7)
Ketorolac	4.1 (8)	1.9 (9)
Indomethacin	3.6 (7)	0.2 (1)
Diclofenac	3.1 (6)	1.5 (9)

differs from the 90% prevalence reported for similar students by Velasco-Rodríguez et al. [17]. This difference may be due to the use of dissimilar measurement methods. Velasco-Rodríguez et al. [17] determined the prevalence of menstrual pain based on the participant's choice of three possible responses: never, always and generally. In our study, prevalence was obtained according to the reported presence of pain in the last 3 months. It is important to emphasize that in order to evaluate the presence or absence of dysmenorrhea, the instruments used to evaluate its occurrence should be homogenized.

We found a small but significant difference in the mean age of menarche, which was lower in the dysmenorrheic group than in the group without dysmenorrhea. This difference in the age of menarche has been observed in other studies [4,8,15,16]. The lower age of menarche in the dysmenorrheic students increases the probable length of time that women are exposed to menses and to prostaglandins [1,5,6]. However, Pawloski [10] did not find any difference in the ages of menarche between dysmenorrheic and not dysmenorrheic women. On the other hand, this important point was not evaluated in the studies of Mexican women conducted by Velasco-Rodríguez et al. [17] and Pedrón-Nuevo et al. [11].

Pain is defined as an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage [18]. Menstrual distress leads to unpleasant and disturbing pain [2–4]. Many women are embarrassed to discuss anything related to menstruation and may not trust that their doctor will consider menstrual pain a genuine problem. Hundreds of studies however, have demonstrated the prevalence of dysmenorrhea and its significant impact. In this sense, dysmenorrheic pain can be as problematic as surgical pain or any other kind of chronic or acute pain [8,18–21]. In our study, 36.1% of women classified their pain as mild and 63.9% as moderate–severe. For this reason, more attention should be paid to the adequate treatment of these patients so these women can carry out their academic lives effectively and without pain.

Several classes of analgesics have been utilized in the treatment of pain. The basic remedies for analgesia are confined to a small

number of medications that include paracetamol, NSAIDs, and opioids. In general, opioids are indicated for the treatment of moderate pain that is non-responsive to NSAIDs and of severe pain [22]. When moderate–severe pain is not alleviated with monotherapy, the co-administration of NSAIDs with opioids is recommended [23]. Curiously, although a significant percentage of dysmenorrheic women suffer severe, disabling pain, therapy with opioids alone or in combination with a NSAID is generally not recommended [5–8]. The treatment of dysmenorrheic pain with NSAIDs in monotherapy may lead to therapeutic failure or a weak analgesic effect [5–8]. These conditions were seen in the present study, of the students using prescribed medications, only 18.4% reported complete remission of symptoms, while 78.1% reported little to moderate alleviation and 3.6% reported no effect on menstrual distress. Similarly, of the students who practiced SM, 23.4% reported complete remission, 75.5% reported little to moderate effectiveness, and 1.0% reported no efficacy. It should be noted that over three-quarters of women experienced pain even with drug treatment. For this reason, it will be necessary to carry out controlled, randomized, blinded studies that address different strategies to alleviate dysmenorrheic pain.

Our results indicate that the most frequent treatment used by dysmenorrheic women was Syncol. Similar results have been found in Mexican high school students [8] and in Mexican nursing students with dysmenorrhea [17]. Syncol is a medication that includes paracetamol, pamabrom and pyrilamine. It is important to point out that there is no scientific evidence assessing the efficacy of Syncol in decreasing menstrual distress [24]. Recently, our group demonstrated that naproxen was statistically more effective than Syncol and Buscapina compositum in alleviating dysmenorrheic pain [8]. In the present study, we did not find any difference in the effectiveness of these three treatments when they were prescribed by physicians. However, data on SM demonstrated that paracetamol was statistically more effective in alleviating dysmenorrheic pain than butylhioscine bromide alone. Well-designed, randomized, controlled trials are required to assess the effectiveness of OTC medications commonly used in the treatment of primary dysmenorrhea.

Of the dysmenorrheic women, only 25.9% consulted a doctor for the problem. This low rate is consistent with results from the previous studies, which found rates ranging from 14% to 37% [8,11,25,26]. Many women are uncomfortable talking about menstruation and reject their menstrual pain. Women may consider pain to be a normal accompaniment to the menstrual cycle and fail to seek medical advice even when their symptoms are severe and incapacitating [8,11,13,25,26]. In the present study, this issue was observed in the significant association between a lack of access to formal medical care and the inability to participate in daily activities, the beginning of symptoms and the severity of dysmenorrheic pain. As a result, most women prefer to use non-pharmacologic remedies and/or SM for their pain [8,11,13,25,26]. In this study, SM was practiced by 61.7% of young women with dysmenorrhea and was significantly associated with an inability to participate in daily activities and the severity of dysmenorrheic

Table 7
Logistic regression of significant variables related to access to formal medical care (AFMC) and self-medication (SM).

	B	Standard error	p-Value	Odds ratio (95% CI)
AFMC				
Incapacitating	0.859	0.190	<0.001	2.360 (1.626–3.424)
Beginning of the symptomatology	0.266	0.105	0.011	1.304 (1.062–1.601)
Severity of dysmenorrheic pain	0.533	0.110	<0.001	1.704 (1.373–2.116)
SM				
Incapacitating	0.320	0.100	0.001	1.376 (1.132–1.674)
Severity of dysmenorrheic pain	0.730	0.148	<0.001	2.074 (1.553–2.771)

pain. Again, these results are consistent with those reported in several other surveys [8,11,13,25,26]. In light of these findings, school-based education and healthcare providers should routinely provide young girls and parents with accurate information regarding the presence of dysmenorrhea and its treatment.

In our survey, 65.0% of women with dysmenorrhea reported that it limited their daily activities. Of these women, 42.1% reported SA. This percentage was greater than the 24.1% in our study of Mexican high school students [8] and was similar to the absenteeism rate reported in other published works [11,13–16,25]. The prevalence of SA provides evidence for the continuing importance of dysmenorrhea as a public health problem in this age group.

The prevalence of dysmenorrhea among university students is high and the pain that these women suffer can be severe and incapacitating. Despite the use of medication to treat the symptoms, the pain is most often not completely relieved. It may be time to test new therapeutic options to relieve dysmenorrheic pain and examine ways to reduce the social, economic and school impact produced by dysmenorrhea in university students.

Acknowledgement

The authors greatly appreciate the technical assistance of Patricia González-Ramírez.

References

- [1] Harel Z. Dysmenorrhea in adolescents and young adults: etiology and management. *J Pediatr Adolesc Gynecol* 2006;19:363–71.
- [2] Jamieson DJ, Steeg JF. The prevalence of dysmenorrhea, dyspareunia, pelvic pain, and irritable bowel syndrome in primary care practices. *Obstet Gynecol* 1996;87:55–8.
- [3] Latthe P, Mignini L, Gray R, Hills R, Khan K. Factors predisposing women to chronic pelvic pain: systematic review. *BMJ* 2006;332:749–55.
- [4] Patel V, Tanksale V, Sahasrabhojane 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.
- [5] Fraser IS. Prostaglandins, prostaglandin inhibitors and their roles in gynaecological disorders. *Baillieres Clin Obstet Gynaecol* 1992;6:829–57.
- [6] French L. Dysmenorrhea in adolescents: diagnosis and treatment. *Paediatr Drugs* 2008;10:1–7.
- [7] Zhang WY, Li Wan Po A. Efficacy of minor analgesics in primary dysmenorrhoea: a systematic review. *Br J Obstet Gynaecol* 1998;105:780–9.
- [8] Ortiz MI, Rangel-Flores E, Carrillo-Alarcón LC, Veras-Godoy HA. Prevalence and impact of primary dysmenorrhea among Mexican high school students. *Int J Gynaecol Obstet* 2009;107:240–3.
- [9] Larroy C, Crespo M, Meseguer C. Functional dysmenorrhoea in the autonomous region of Madrid: study of the prevalence in function of the age. *Rev Soc Esp Dolor* 2001;8:11–22.
- [10] Pawlowski B. Prevalence of menstrual pain in relation to the reproductive life history of women from the Mayan rural community. *Ann Hum Biol* 2004;31:1–8.
- [11] Pedrón-Nuevo N, González-Unzaga LN, De Celis-Carrillo R, Reynoso-Isla M, de la Torre-Romeral L. Incidence of dysmenorrhea and associated symptoms in women aged 12–24 years. *Ginecol Obstet Mex* 1998;66:492–4.
- [12] Banikarim C, Chacko MR, Kelder SH. Prevalence and impact of dysmenorrhea on Hispanic female adolescents. *Arch Pediatr Adolesc Med* 2000;154:1226–9.
- [13] Polat A, Celik H, Gurates B, et al. Prevalence of primary dysmenorrhea in young adult female university students. *Arch Gynecol Obstet* 2009;279:527–32.
- [14] Ozerdogan N, Sayiner D, Ayrançi U, Unsal A, Giray S. Prevalence and predictors of dysmenorrhea among students at a university in Turkey. *Int J Gynaecol Obstet* 2009;107:39–43.
- [15] Zukri SM, Naing L, Hamzah TNT, Hussain NHN. Primary dysmenorrhea among medical and dental university students in Kelantan: prevalence and associated factors. *IMJ* 2009;16:93–9.
- [16] Loto OM, Adewumi TA, Adewuya AO. Prevalence and correlates of dysmenorrhea among Nigerian college women. *Aust N Z J Obstet Gynaecol* 2008;48:442–4.
- [17] Velasco-Rodríguez R, Mora-Brambila AB, González-Ortega LE, Bonilla-Gutiérrez OJ. Clinical characteristics and treatment of dysmenorrhoea in nursing students. *Rev Enferm IMSS* 2006;14:29–34.
- [18] Loeser JD, Treede RD. The Kyoto protocol of IASP basic pain terminology. *Pain* 2008;137:473–7.
- [19] Bouhassira D, Lantéri-Minet M, Attal N, Laurent B, Touboul C. Prevalence of chronic pain with neuropathic characteristics in the general population. *Pain* 2008;136:380–7.
- [20] Visentin M, Zanolin E, Trentin L, Sartori S, de Marco R. Prevalence and treatment of pain in adults admitted to Italian hospitals. *Eur J Pain* 2005;9:61–7.
- [21] Strohbuecker B, Mayer H, Evers GC, Sabatowski R. Pain prevalence in hospitalized patients in a German university teaching hospital. *J Pain Symptom Manage* 2005;29:498–506.
- [22] WHO (World Health Organization). *Cancer pain relief*, 2nd ed., Geneva, Switzerland: World Health Organization; 1996.
- [23] Curatolo M, Svetlic G. Drug combinations in pain treatment: a review of the published evidence and a method for finding the optimal combination. *Best Pract Res Clin Anaesthesiol* 2002;6:507–19.
- [24] Girolamo G, Sánchez AJ, De los Santos AR, González CD. Is acetaminophen, and its combination with pamabrom, an effective therapeutic option in primary dysmenorrhoea? *Expert Opin Pharmacother* 2004;5:561–70.
- [25] Johnson J. Level of knowledge among adolescent girls regarding effective treatment for dysmenorrhea. *J Adolesc Health Care* 1988;9:398–402.
- [26] O'Connell K, Davis AR, Westhoff C. Self-treatment patterns among adolescent girls with dysmenorrhea. *J Pediatr Adolesc Gynecol* 2006;19:285–9.