Primary dysmenorrhoea among reproductive-age women at Kuala Selangor health clinic: Prevalence and factors associated

Yafizah Yahaya, MMED[1], Adibah Hanim Ismail, MMED[2], Nurainul Hana Shamsuddin, MMED[2]

[1]Family Medicine Unit, Faculty of Medicine and Health Sciences, Universiti Sains Islam Malaysia, Nilai, Negeri Sembilan, Malaysia, [2]Department of Family Medicine, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, Serdang, Selangor, Malaysia

ABSTRACT

Introduction: Primary dysmenorrhoea (PD) is a frequent gynaecological condition in adolescents and adult women worldwide, affecting their daily activity and leading to a lower quality of life. The purpose of this study is to determine the prevalence, severity, and factors associated with PD among reproductive-age women at Kuala Selangor Health Clinic.

Materials and Methods: This cross-sectional study used systematic random sampling at the Kuala Selangor Health Clinic from 3rd July to 29th September 2017. This study included 213 women between the age of 18 and 35 years old. The questionnaires consist of sociodemographic, lifestyle activities, and menstrual history components with Numerical Rating Scale (NRS) for menstrual pain as well as the Pictorial Blood Assessment Chart (PBAC) to quantify the blood loss during menstruation.

Results: A total of 210 women participated in this study with a response rate of 98.6%. The prevalence of PD was 60.5% with 13.4%, 75.6%, and 11.0% for mild, moderate, and severe in intensity, respectively. Nulliparous (OR: 5.1, CI: 1.508, 17.277, *p* = 0.009), first-degree family history of dysmenorrhoea (OR: 4.431, CI: 1.727, 11,368, *p* = 0.002), heavy menstrual blood flow (OR: 11.6, CI: 2.849, 47.53, p <0.001), and lack of regular physical exercise (OR: 14.037, CI: 5.161, 38.183, *p* < 0.001) were found as the significant association for PD. Meanwhile, having a short menstruation reduces the risk of PD during menstruation (OR: 0.04, CI: 0.004, 0.391, *p* = 0.006).

Conclusion: PD is prevalent among reproductive-age women. Physical exercise is a protective factor for PD, hence health care providers particularly those in primary care settings should regularly counsel and encourage women to be physically active.

KEYWORDS:
Primary dysmenorrhoea, reproductive-aged women, primary care, Malaysia

INTRODUCTION

Dysmenorrhoea is defined as pain during menstruation and is classified as either primary or secondary dysmenorrhoea (SD).[1] Primary dysmenorrhoea (PD) is a menstrual pain without any pelvic pathology that develops 1 or 2 years after menarche and can last up to 40 years. The pain is described as cramping or spasmodic located at the lower abdomen and radiating to the thigh's back or medial aspect. The pain started a few hours before or shortly after menstruation and lasted up to 48–72 h.[2] Secondary dysmenorrhoea is menstrual pain caused by an underlying gynaecological condition. The most common causes of SD are uterine fibroid, endometriosis, and adenomyosis.[1] The pain typically begins 1–2 weeks before menstruation and can last for a few days after menstruation has ceased.[1,2]

PD, which is more common than SD, has a significant impact on women's daily activities and quality of life. Studies have shown that PD causes work or school absenteeism,[3,4] limitations in social activities,[3-5] psychological disorders such as depression and anxiety,[6] and increased self medication.[4] The prevalence of PD ranges from 59 to 96 %[5,7–9] worldwide. In Malaysia, PD was found in 74–76% of adolescence[10,11] and 50–78% among university students.[3,12,13]

Several studies have found that some modifiable factors, including physical exercise and second hand smoker are significantly related to PD while other factors such as body mass index (BMI) and frequent fast food intake were not. Studies on the factors contributing to PD in Malaysia were limited to adolescent and university students with no studies conducted in the community. Previous local research found that race,[12] positive family history of dysmenorrhoea,[3,12] and lack of physical exercise[3] were all strongly linked with PD. However, Soe et al.[13] found a negative association between BMI, fast food intake, and physical exercise with PD.

In Malaysia, there are scarce studies on the factors contributing to PD, especially those not changeable. Other factors associated with PD, including occupation, parity, smoking, second-hand smoking, and attempting to lose weight, have yet to be studied in Malaysia. The purpose of this study was to determine the prevalence of PD among reproductive-age women, the severity of the disease, and the factors associated with PD.

MATERIALS AND METHODS

This was a cross-sectional study conducted from 3rd July 2017

This article was accepted: 19 July 2022
Corresponding Author: Yafizah Yahaya
Email: yafizah@usim.edu.my

to 29th September 2017 at Kuala Selangor Health Clinic in Selangor, a state in Malaysia. The sampling frame was registered women with ages ranging from 18 to 35 years old who attended the out-patient clinic during the duration of the study. The inclusions criteria were reproductive-age women (18–35 years old) and understand the Malay language whereas participants who were pregnant, had a history of gynaecological diagnosis or surgery, had menstruation more than 6 months ago, presented to the clinic with an acute life-threatening illness, or had SD (exclusion by symptoms) were excluded from the study. Participants were asked if they had menstrual pain 1–2 weeks before menstruation and if it lasted until a few days after it stopped. If the response is yes, the participant was excluded because suspicious of SD.

A structured questionnaire in the Malay language was developed consisting of three sections namely sociodemographic, menstruation, and lifestyle. The first section covered socio-demographic characteristics such as age, race, occupation, parity status, and marital status. The second section of the questionnaire explored the participants' menstrual history, such as the age of menarche, regularity of menstrual cycle, blood loss during menstruation, duration of menstruation, and first-degree family history of dysmenorrhoea. Pictorial Blood Loss Assessment Chart (PBAC) was used to determine the blood loss during menstruation. The chart has been validated for menstrual blood loss[14-16] and reliable[15] with Cronbach α 0.7–0.8. The total scoring from the PBAC chart was categorised into > 100, 16–99, and < 15 for heavy, normal, and light menstrual blood loss, respectively. Participants were also asked whether they experienced PD with a yes or no format response. If the answer is yes, they need to answer the severity of the PD question using the Numerical Rating Scale (NRS). The tool was validated for measurement severity of pain for general acute pain[17] and reliable[18] with Cronbach α 0.8. The participant will rate their menstrual pain and the scoring of the marks of 1–3, 4–7, and 8–10 indicate mild, moderate, and severe in intensity, respectively. The third section of the questionnaires was used to determine the participants' BMI and their lifestyle activity such as smoking habits whether smoker, non-smoker, or second-hand smoker, regularity of practising physical exercise, frequent fast-food intake, and any attempt to lose weight. Height and weight were measured, and BMI was calculated during the interview. For the lifestyle questionnaire, the format answer was either yes or no. All the responses were self-reported by the participants.

The menstrual cycle was classified as regular if the participants had menstruation at regular intervals of 21–35 days from the last menstrual cycle.[19] For the duration of menstruation, less than 4 days, 4–8 days, and more than 8 days were categorized as short, regular, and prolonged duration, respectively.[20] Biological mother, sister, or twin was classified as first-degree family. A smoker is defined as who is currently smoking at least one tobacco product every day over a period > 1 month,[21,22] whereas a second-hand smoker is someone who is being exposed to another person's tobacco smoke (mainstream smoke and sidestream cigarette smoke) for at least 15 minutes every day on > 1 day/week.[23] BMI was calculated using the kg/m^2 formula, and the classification followed the Malaysia Ministry of Health.[24] Regular physical exercise was defined as a participant practising moderate-intensity physical exercise for more than 150 minutes per week or at least 75 minutes per week of high-intensity physical exercise.[25] The participant who took fast food more than once a month was categorized as frequent fast-food intake[26] meanwhile attempting to lose weight was defined whether the participant currently trying to lose weight in whatever method such as low carbohydrate diet, low-fat diet, low-calorie diet, consume slimming pills or supplements, involve in commercial slimming program, induced vomiting, or practising physical exercise.

Two Family Medicine Specialists performed content and face validity. Pretested among 30 women before the data collection was done at the same clinic. They were recruited using the same eligibility criteria with systematic random sampling one in four. Participants who were involved were included in the name list and were subsequently excluded during the actual data collection. No changes either questionnaire or flow of the study after the pretested research was done.

The sample size was calculated based on Pocock's formula with 80% power and significance level α at 0.05 with a 95% confidence interval. Based on the previous study,[9] 210 participants were required, with an estimated 90% eligibility and 80% response rate. After screening using eligibility criteria, participants were recruited using systematic random sampling one in four and were chosen according to the number series in the interval of 4 starting from number 3. The patient information sheet was given to the participant and written consent was obtained. The questionnaire was given to the participant and was using face to face interview method by the main researcher. Ten to fifteen minutes were required to complete the questionnaire. The completeness of the questionnaire was re-check at the end of the interview session. Completed questionnaires were stored in an envelope to maintain confidentiality. Participants with PD who had heavy menstrual bleeding were given an appointment in the outpatient clinic for further gynaecological assessment and examination.

The data were analyzed using Statistical Package for Social Sciences (SPSS) IBM version 22.0. A significant *p* value was set at <0.05 with a 95% confidence interval (CI). The characteristics of the participants, the prevalence of PD, and the severity of PD were described in descriptive analysis using percentages and frequency. Simple logistic regression (SLR) was used for univariate analysis. Significant independent factors associated with PD were included in multiple logistic regression (MLR) for further prediction contributing to PD. Multicollinearity was done before proceeding with MLR analysis, and the Hosmer–Lemeshow test was used to see the model's fit. The independent variables are age, race, parity, occupation, age of menarche, regularity of menstrual cycle, duration of menses, menstrual blood loss, family history of dysmenorrhoea, BMI, smoking, second-hand smoker, regularity of physical exercise, attempting to lose weight, and frequency of fast-food intake meanwhile the dependent variable is PD.

Table I: Sociodemographic, menstrual, and lifestyle characteristic of respondents (n = 210)

Variables	n	%	
Age (years)			Median:25.00
18–24	102	48.6	
25–29	56	26.6	
30–35	52	24.8	
Race			
Malay	134	63.8	
Chinese	10	4.8	
Indian	66	31.4	
Others	0	0	
Occupation			
Professional	27	12.9	
Non-Professional	111	52.9	
Unemployed	72	34.2	
Parity			
Nulliparous	144	68.6	
Parous	66	31.4	
Marital status			
Single	130	61.9	
Married	75	35.7	
Separated/divorce	5	2.4	
Age of menarche			
< 11 years old	33	15.7	
> 11 years old	177	84.3	
Menstrual cycle			
Regular	179	85.2	
Irregular	31	14.8	
Duration of menstruation			
Normal	189	90	
Short	12	5.7	
Prolong	9	4.3	
Menstrual blood loss (PBAC Scoring)			Median: 84.00
Normal	150	71.4	
Light	6	2.9	
Heavy	54	25.7	
Family history of dysmenorrhoea			
Yes	119	56.7	
No	91	43.3	
Body mass index (BMI)			
Normal	68	32.4	
Underweight	29	13.8	
Overweight	46	21.9	
Obese	67	31.9	
Smoking			
Yes	7	3.3	
No	203	203	
Second-hand smoker δ			
Yes	79	38.9	
No	124	68	
Regular physical exercise			
Yes	68	32.4	
No	142	67.6	
Frequent fast-food intake			
Yes	167	79.5	
No	43	20.5	
Attempting to lose weight			
Yes	81	38.6	
No	129	61.4	

δ= 203 respondents

Table II: The association between sociodemographic, menstrual, and lifestyle factors with PD among reproductive-age women (n=210)

Variables	No PD n (%)	PD n (%)	Crude OR (95% CI)	*p* value
Age (years)				
18–24	31 (30.4)	71 (69.6)	3.665 (1.82 - 7.38)	
25–29	20 (35.7)	36 (64.3)	2.880 (1.31 - 6.29)	
30–35	32 (61.5)	20 (38.5)	1	**0.001***
Race				
Chinese	7 (70%)	3 (30)	1	0.111
Indian	28 (42.4)	38 (57.6)	3.167 (0.75 - 13.33)	
Malay	48 (35.8)	86 (64.2)	3.181 (0.93 – 16.91)	
Occupation				
Professional	10 (37)	17 (63)	1	0.255
Non-Professional	39 (35.1)	72 (64.9)	1.086 (0.45 – 2.60)	
Unemployed	34 (47.2)	38 (52.8)	0.657 (0.26 – 1.63)	
Parity				
Nulliparous	43 (29.9)	101 (70.1)	3.614 (1.96 – 6.64)	
Parous	40 (60.6)	26 (39.4)	1	**< 0.001***
Age of menarche				
< 11 years old	10 (30.3)	23 (69.7)	1	0.241
> 11 years old	73 (41.2)	104 (58.8)	1.614 (0.72 – 3.59)	
Menstrual cycle				
Regular	65 (36.3)	114 (63.7)	2.428 (1.11 - 5.27)	**0.025***
Irregular	18 (58.1)	13 (41.9)	1	
Duration of menstruation				
Normal	72 (38.1)	117 (61.9)	1	**0.040***
Short	9 (75)	3 (25)	0.205 (0.054 - 0.78)	
Prolong	2 (22.2)	7 (77.8)	2.154 (0.43 - 10.65)	
Menstrual blood loss (PBAC Scoring)				
Normal	76 (50.7)	74 (49.3)	1	**< 0.001***
Light	4 (66.7)	2 (33.3)	0.514 (0.09 - 2.88)	
Heavy	3 (5.6)	51 (94.4)	17.459 (5.21 - 58.4)	
Family history of dysmenorrhoea				
Yes	27 (22.7)	92 (77.3)	5.452 (2.98 – 9.95)	**< 0.001***
No	56 (61.5)	35 (38.5)	1	
Body mass index (BMI)				
Normal	27 (39.7)	41 (60.3)	1	0.546
Underweight	8 (27.6)	21 (72.4)	1.729 (0.67 - 4.46)	
Overweight	20 (43.5)	26 (56.5)	0.856 (0.40 - 1.8)	
Obese	28 (41.8)	39 (58.2)	0.917 (0.46 - 1.8)	
Smoking				
Yes	2 (28.6)	5 (71.4)	1.660 (0.31 - 8.76)	
No	81 (39.9)	122 (60.1)	1	0.551
Second-hand smoker δ				
Yes	19 (24.1)	60 (75.9)	3.158 (1.69 - 5.89)	
No	62 (50)	62 (50)	1	**< 0.001***
Regular physical exercise				
Yes	51 (75)	17 (25)	1	**< 0.001***
No	32 (22.5)	110 (77.5)	10.312 (5.24 - 20.26)	
Frequent fast-food intake				
Yes	58 (34.7)	109 (65.3)	2.610 (1.31 - 5.17)	
No	25 (58.1)	18 (41.9)	1	**0.006***
Attempting to lose weight				
Yes	33 (40.7)	48 (59.3)	0.921 (0.52 - 1.62)	
No	50 (38.8)	79 (61.2)	1	0.775

1= Reference group. *= p <0.05 significance association. δ= 203 respondents. OR= Odds Ratio. CI= Confidence Interval.

RESULTS

Out of 210 women (98.6% response rate) who participated in this study, 127 (60.5%) of them have PD. Based on the NRS, among the PD group, 17 (13.4%), 96 (75.6%), and 14 (11%) had mild, moderate, and severe pain, respectively.

Sociodemographic, menstrual, and lifestyle characteristic

The median age of the participant was 25 years old. The majority of the participants were Malay (63.8%) followed by Indian (31.4%) and Chinese (4.8%). Most of them were nulliparous (68.6%). The median age of menarche in this study was 12 years old. Majority of the participants attained menarche at the age of >11 years old (84.3%), regular menstrual cycle (85.25%), and had normal menstrual blood flow (71.4%). For BMI, 13.8%, 32.4%, 21.9%, and 31.9% were underweight, normal weight, overweight and obese, respectively. Only 3.3% of the participants were found as smokers, whereas 38.9% were identified as second-hand

Table III: Multivariate analysis of independent factors associated with PD among reproductive-age women

Variables	Adjusted OR	95% CI		*p* value
		Lower	Upper	
Age (years)				
18–24	1.558	0.408	5.956	0.517
25–29	3.404	0.884	13.106	0.075
30–35	Ref			
Parity				
Nulliparous	5.104	1.508	17.277	**0.009***
Parous	Ref			
Menstrual cycle				
Regular	2.979	0.900	9.855	0.074
Irregular	Ref			
Duration of menstruation				
Normal	Ref			
Short	0.040	0.004	0.391	**0.006***
Prolong	0.283	0.023	3.535	0.327
Menstrual blood loss (PBAC Scoring)				
Normal	Ref			
Light	0.342	0.015	7.704	0.5
Heavy	11.636	2.849	47.533	**0.001***
Family history of dysmenorrhoea				
Yes	4.431	1.727	11.368	**0.002***
No	Ref			
Second-hand smoker				
Yes	1.961	0.741	5.187	0.175
No	Ref			
Regular physical exercise				
Yes	Ref			
No	14.037	5.161	38.183	**<0.001***
Frequent fast-food intake				
Yes	2.623	0.826	8.333	0.102
No	Ref			

Ref= Reference group. *= p <0.05 significance association. OR= Odds Ratio. CI= Confidence Interval
Hosmer and Lemeshow test suggested model good fit for data. $\chi 2 = 6.155$, p= 0.630
Cox and Snell $R^2 = 0.502$, Nagelkerke $R^2 = 0.679$

smokers, and many of them practice sedentary physical activity (67.6%) and frequent fast-food intake (79.5%). The findings are shown in Table I.

Factors Associated with PD

Univariate analysis using SLR found age, parity, family history of dysmenorrhoea, regularity, duration and menstrual blood loss, second-hand smoker, regular physical exercise, and frequent fast-food intake were significant factors associated with PD as shown in Table II. Further analysis using MLR found null parity, heavy menstruation, positive family history of dysmenorrhoea, and lack of regular physical exercise as the significant association for PD, which is shown in Table III. Women who had a short duration of menstruation were found lesser probability to have PD.

DISCUSSION

The prevalence of PD among reproductive-aged women at Kuala Selangor Health Clinic was 60.5% (n=127). When compared to the local research among university students,[3,12,13] the outcome prevalence of PD ranged from 50.9% to 78%. There is no comparable local study with a similar age group in the community setting to our investigation. However, in a survey conducted by Amini et al.[27] in a community setting in Indonesia, the prevalence of PD was 62.5%, which is not significantly different from our findings. Other studies were done in the community setting with similar age groups in South Korea,[28] Turkey,[29] and Iran[30] found that the PD prevalence is in the range of 58.8% to 63.6%.

Among our participants who had PD, three-quarters (75.6%) had moderate pain followed by mild (13.4%) and severe pain (11.0%). The findings were similar to those of local studies by Jaiprakash et al.[12] and Soe et al.[13] However, the researchers used different tools to determine the intensity of the pain, which is the Verbal Multidimensional Scoring System. Meanwhile, Shamsunarnie et al.[3] discovered disparities in pain assessment scores while using similar methods as in this study although majority of their participants had mild pain. The differences in pain perception could explain the findings and threshold among the subjects studied. Furthermore, pain perception is possibly influenced by the background, lifestyle, and culture of the women.[5]

This study discovered that parity is a significant factor leading to PD with nulliparous women are 5.1 times more likely to have the disease compared to the parous group. However, we are unable to compare our findings to those of local studies. However, our results were similar to previous studies by Heilemeskel et al.[9] and Patel et al.[31] in which nulliparous women are more likely to have PD. Multiparous women were assumed to be less prone to PD due to pudendal nerve compression and stretching during delivery, resulting in pelvic floor neuropathy.[32]

Heavy menstruation was found to be a significant factor contributing to PD. Our finding is consistent with Habibi et al.,[5] which also used PBAC as a tool to quantify menstrual blood loss. It was postulated that women with heavy menstruation had a high level of prostaglandin F2A and E2, which increased uterine activity and caused uterine hypoxia and pain.[33,34] Our findings contradict with a local study by Shamsunarnie et al.[3] although they did not specify the instruments for quantifying blood losses in their research. A first-degree family history of dysmenorrhoea was also discovered to be a risk factor for PD. The findings were consistent with those of other research conducted around the world.[3,5,7,9,12,35] They were seen to have a similar lifestyle since they stayed together[12] and they learned their behaviour in the family.[35]

Women with shorter menstruation were found to be lesser probability to have PD. The level of prostaglandin synthesis and release was low in women with brief menstrual cycles.[33] Our findings differ from Sahin et al.[7] who discovered no link between menstrual duration and PD. However, their definition of menstrual duration is different whereby less than 2 days, 2–7 days, and more than 7 days are considered short, regular, and prolonged menstruation, respectively.

Physical exercise was found to be a modifiable associated factor for PD. Women who do not exercise regularly are 14 times more likely to develop PD, and our findings are consistent with other studies.[3,36] Intervention studies by Ortiz et al.[37] and Mahvash et al.[38] found that regular physical exercise can lower the severity of PD and can even cure it. It was postulated that the endorphin hormone released during physical exercise could inhibit pain perception and improve mood among the exercisers.[38]

Other modifiable factors, such as second-hand smoking and frequent fast-food consumption, were unrelated to PD. Regarding second-hand smokers, the findings are different from those of Amini et al.[27] and Chen et al.[39] Both studies, however, did not define second-hand smokers clearly including the frequency and the duration of tobacco smoke in the surroundings. Even though more than three-quarters of our sample group consumed fast food regularly, we discovered no evidence of a link between this factor and PD. Our finding is matched with a local investigation by Soe et al.[13]

The impact of PD on the study population was not investigated in this study, which was regarded as a limitation of the study and suggested for future research. However, a previous local study discovered that PD has a significant impact on women's lives, such as class absenteeism and interfering with daily activities.[3]

STRENGTH AND LIMITATION

This is the first study of PD in a community setting among Malaysian women. This survey had a broader scope than the earlier local studies, which were more focused on adolescent and university students. Our findings revealed that PD is still a widespread issue among reproductive-aged women.

Our study has a few drawbacks. The findings of our study were unable to reflect reproductive-age women in Malaysia because our participants came from a single government primary health clinic in Malaysia, the majority of whom were Malay, and the location was in a semi-urban area. Thus, the generalization of the finding was limited. Besides that, the diagnosis of PD and SD was based on symptoms and was not supported by a gynaecological examination and ultrasound due to financial constraints. Furthermore, the participants in this study answered the question by self-reporting, which has a high possibility of recall bias.

It is recommended that in the future, large-scale research is to be conducted in a variety of settings such as a community setting or a primary care clinic as well as the impact of PD towards women. The findings will be more diverse and may be extrapolated to a larger population.

CONCLUSION

The prevalence of PD in this study was 60.5% and three-quarters of them (75.6%) reported having moderate pain. This study showed that null parity, positive family history of dysmenorrhoea, menorrhagia, and lack of exercise are the risk factors for PD. Meanwhile, it was discovered that having a short duration of menstruation was a protective factor. Therefore, health care providers, particularly those in primary care, should encourage women to engage in regular physical activity to reduce the prevalence and severity of PD.

ETHICAL APPROVAL

Approval was obtained from the National Medical Research Registry (NMRR-16-1832-32450), Medical Research & Ethics Committee of the Ministry of Health Malaysia (MREC), and Research & Ethics Committee of UPM (JKEUPM). All participants volunteered and gave their consent before taking part in this study.

ACKNOWLEDGEMENTS

The authors would like to thank the Director-General of Health Malaysia for his kind permission to publish this paper. We also want to thank the District Office of Kuala Selangor for the permission to conduct this study at Kuala Selangor Health Clinic.

CONFLICT OF INTEREST

The authors involved in this study declare that there was no conflict of interest.

REFERENCES

1. ACOG. Dysmenorrhea: Painful Periods [Internet]. American College of Obstetricians and Gynecologists; 2015. [cited June 2022] Available from: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2883573&tool=pmcentrez&rendertype=abstract
2. Jolin JA, Rapkin A. Pelvic pain and dysmenorrhea. In: Berek JS, editor. Novak's Gynecology. 13th ed. Philadelphia: Lippincott Williams & Wilkins; 2002. p. 182.

3. Shamsunarnie Mohd. Z, Lin N, Hamzah TNT, Hussain NHN. Primary dysmenorrhea among medical and dental university students in Kelantan: Prevalence and associated factors. Int Med J. 2009; 16(2): 93-9.
4. Wong LP. Premenstrual syndrome and dysmenorrhea: urban-rural and multiethnic differences in perception, impacts, and treatment seeking. J Pediatr Adolesc Gynecol. 2011; 24(5): 273-7.
5. Habibi N, Huang MSL, Gan WY, Zulida R, Safavi SM. Prevalence of primary dysmenorrhea and factors associated with its intensity among undergraduate students: a cross-sectional study. Pain Manag Nurs. 2015; 29: 503-50.
6. Gagua T, Tkeshelashvili B, Gagua D, Mchedlishvili N. Assessment of anxiety and depression in adolescents with primary dysmenorrhea: a case-control study. J Pediatr Adolesc Gynecol. 2013; 26(6): 350-4.
7. Sahin S, Ozdemir K, Unsal A, Arslan R. Review of frequency of dysmenorrhea and some associated factors and evaluation of the relationship between dysmenorrhea and sleep quality in university students. Gynecol Obstet Invest. 2014; 78(3): 179-85.
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(3): 240-3.
9. Hailemeskel S, Assefa N, Demissie A. Primary dysmenorrhea magnitude, associated risk factors, and its effect on academic performance: evidence from female university students in Ethiopia. Int J Womens Health. 2016; 8: 489-96.
10. Wong LP, Khoo EM. Dysmenorrhea in a multiethnic population of adolescent Asian girls. Int J Gynecol Obstet. 2010; 108(2): 139-42.
11. Wong LP. Attitudes towards dysmenorrhoea, impact and treatment seeking among adolescent girls: A rural school-based survey. Aust J Rural Health. 2011; 19(4): 218-23.
12. Jaiprakash H, Myint K, Chai L, Nasir B. Prevalence of dysmenorrhea and its sequel among medical students in a Malaysian University. Br J Med Med Res. 2016; 16(9): 1-8.
13. Soe H, Than N, Lwin H, Htay M, Phyu K, Moe S. Premenstrual symptoms and dysmenorrhea associated with daily routine activities among female undergraduate medical students. Br J Med Med Res. 2017; 21(2): 1-9.
14. Higham JM, O'Brien PM, Shaw RW. Assessment of menstrual blood loss using a pictorial chart. Br J Obstet Gynaecol. 1990; 97(8): 734-9.
15. Hald K, Lieng M. Assessment of Periodic Blood Loss: Interindividual and intraindividual variations of pictorial blood loss assessment chart registrations. J Minim Invasive Gynecol. 2014; 21(4): 662-8.
16. Janssen CAH, Scholten PC, Heintz APM. A simple visual assessment technique to discriminate between menorrhagia and normal menstrual blood loss. Obstet Gynecol. 1995; 85(6): 977-82.
17. Chanques G, Viel E, Constantin JM, Jung B, Lattre S De, Carr J, et al. The measurement of pain in intensive care unit: Comparison of 5 self-report intensity scales. Pain. 2010; 151(3): 711-21.
18. Hollen PJ, Gralla RJ, Kris MG, McCoy S, Donaldson GW, Moinpour CM. A comparison of visual analogue and numerical rating scale formats for the Lung Cancer Symptom Scale (LCSS): Does format affect patient ratings of symptoms and quality of life? Qual Life Res. 2005; 14(3): 837-47.
19. Peter O'Donovan, Paul McGurgan WP. Conservative surgery for menorrhagia. London: Greenwich Medical Media; 2003.
20. ACOG. Abnormal Uterine Bleeding (AUB) New Standardized Terminology, Definitions, Classification History [Internet]. 2012. [cited June 2022] Available from: http://www.acog.org/-/media/Districts/District-VIII/AbnormalUterineBleeding.pdf
21. Institute for Public Health (IPH). National Health and Morbidity Survey 2015 - Report on Smoking Status Among Malaysian Adults. Vol. 1, National Health and Morbidity Survey 2015. 2015. 48 p.
22. Ministry of Health. Global Adult Tobacco Survey (Gats) Malaysia 2011 Malaysia-2011. Global Adult Tobacco Survey (GATS) Malaysia 2011; 2012. 204 p.
23. Ministry of Health Malaysia. Clinical practice guidelines on treatment of tobacco use disorder. 2016.
24. Ministry of Health. Clinical Practice Guidelines; Management of Obesity. Ministry of Health. 2004.
25. Kementerian Kesihatan Malaysia. Garis Panduan Aktiviti Fizikal Malaysia. 2016.
26. Ministry of Health. Intervensi Faktor Risiko NCD dalam Komuniti. Ministry of Health. 2015. 165 p. [cited June 2022] Available from: http://www.pharmacy.gov.my/v2/ms/dokumen/formulari-ubat-kementerian-kesihatan-malaysia.html
27. Amini R, Raden A, Hidayati RS, Dewi YLR, Indrayanti Y. The effect of passive smoking on the incidence of primary dysmenorrhea. Folia Medica Indones. 2011; 47(3): 160-5.
28. Jang IA, Kim MY, Lee SR, Jeong KA, Chung HW. Factors related to dysmenorrhea among Vietnamese and Vietnamese marriage immigrant women in South Korea. Obstet Gynecol Sci. 2013; 56(4): 242-8.
29. Unsal A, Ayranci U, Tozun M, Arslan G, Calik E. Prevalence of dysmenorrhea and its effect on quality of life among a group of female university students. Ups J Med Sci. 2010; 115(2): 138-45.
30. Kordi M, Mohamadirizi S, Shakeri MT. The relationship between occupational stress and dysmenorrhea in midwives employed at public and private hospitals and health care centers in Iran (Mashhad) in the years 2010 and 2011. Iran J Nurs Midwifery Res. 2013; 18(4): 316-22.
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 An Int J Obstet Gynaecol. 2006; 113(4): 453-63.
32. Fonti Y, Giordano R, Cacciatore A, Romano M, Rosa B La, Mammaro A. Post partum pelvic floor changes. J Prenat Med. 2009; 3(4): 57-9.
33. Livshits A, Seidman DS. Role of non-steroidal anti-inflammatory drugs in gynecology. Pharmaceuticals. 2010; 3(7): 2082-9.
34. Dawood MY. Dysmenorrhea and prostaglandins. In: Gold JJ, Josimovich JB, editors. Gynecologic Endocrinology. Springer; 1987.
35. Unsal A, Tozun M, Aslan G. Evaluation of dysmenorrhea among women and its impact on quality of life in a region of Western Turkey. Park J Med Sci. 2010; 26(1): 142-7.
36. Saeideh Rezvani, Farzaneh Taghian MV. The effect of aquatic exercises on primary dysmenorrhoea in nonathlete girls. Iran J Nurs Midwifery Res. 2013; 5(18): 378-83.
37. Ortiz MI, Cortés-Márquez SK, Romero-Quezada LC, Murguía-Cánovas G, Jaramillo-Díaz AP. Effect of a physiotherapy program in women with primary dysmenorrhea. Eur J Obstet Gynecol Reprod Biol. 2015; 194: 24-9.
38. Mahvash N, Eidy A, Mehdi K, Zahra MT, Mani M, Shahla H. The effect of physical activity on primary dysmenorrhea of female university students. World Appl Sci J. 2015; 17: 1246-52.
39. Chen C, Cho S, Damokosh AI, Chen D, Li G, Wang X. Prospective study of exposure to environmental tobacco smoke and dysmenorrhea. Environ Health Perspect. 2000; 108(11): 1019-22.