DOI https://doi.org/10.70280/njph(2025)v2i1.26

Risk Factors of Primary Dysmenorrhea among Undergraduate Students of a Medical Institution of Nepal

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ABSTRACT

Background: Primary dysmenorrhea (PD) has significant impact on life of young females. This study aimed to find various risk factors of primary dysmenorrhea and its impact on daily life.

Methods: A cross-sectional study was done in 165 female undergraduate students (age ≤24 years) of Institute of Medicine by convenience sampling method. It was a questionnaire-based study. Anthropometric measurements were taken for Body Mass Index (BMI), waist circumference and waist hip ratio.

Results: The study showed presence of PD in 98.2% participants among whom 20.6% had mild, 32.6% had moderate and 44.8% had severe PD. Pre-menstrual symptoms (PMS) was significantly associated with severity of PD (p <0.001, OR: 3.603, CI: 1.675-7.752). However, there was no statistically significant correlation seen with early age of menarche (p = 0.932) and family history of dysmenorrhea (p value= 0.70). No association was seen between severity of PD with BMI (p = 0.720), waist circumference (p = 0.850) and waist hip ratio (p = 0.858).

Severity of PD was associated with limitations in daily activity (p value<0.001, OR:6.302, CI: 2.855-13.911), behavioral changes (p =0.001, OR: 2.638, CI: 1.186-5.864) and skipping of college (p < 0.001, OR: 10.00, CI: 2.922-34.227).

Conclusion: The prevalence of primary dysmenorrhea was very high in young females. Institutional and social support system, plans and policies to support and create easy accessibility to treatment is needed. Only then young women will be able to achieve their full potential and hence social equity will be achieved.

Keywords: Dysmenorrhea, undergraduate students, menstruation, medical

Received on: 24 December 2024
Accepted on: 24 February 2025

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BACKGROUND

Menstruation is shedding of endometrium at the end of monthly sexual cycle in females. This physiological phenomenon is often complicated by dysmenorrhea. (1) Primary dysmenorrhea (PD) is moderate to severe pain in lower abdomen in young women before and during their menstruation without any obvious gynecological disease.(2) Dysmenorrhea is the most prevalent gynecological disorder seen in 45-95% of women in child bearing age in the world.(3) In a study done in large population of Australian girls, the prevalence was found to be 93%.(4) In a cross-sectional study done at a medical college in Nepal 67% experienced dysmenorrhea and 85% experienced increase in frequency and severity after joining the medical school.(5) In a study done in secondary and higher secondary public schools of Bharatpur, Chitwan, Nepal, 87.5% of students complained of dysmenorrhea which caused 38.1% class absenteeism.(6)

Dysmenorrhea is often under-diagnosed, under- treated and taken as a natural pain that must be accepted during menstruation.(3,7)

The pathogenesis of PD is due to increased secretion of Prostaglandin

F2α (PGF2α) and Prostaglandin E2 (PGE2) during endometrial sloughing in uterus which causes increase in myometrial contraction and vasoconstriction. This causes ischemia which leads to accumulation of anaerobic metabolites sensitizing pain fibers and ultimately causing pelvic pain. Hence PD is more in first few days of menstruation.(7-9) Increased level of leukotrienes and vasopressin has also been linked to pathogenesis of PD.(10)

Dysmenorrhea is related to degradation in quality of life, stress, social, economic and occupational conditions and school absence in young girls.(2) In a study done by Parker et al. 26% of participants reported absence from school and 24% had interference with life activities due to PD. Mood disturbances was reported in 73% and 93% reported pre- menstrual syndrome (PMS) during or starting few days before menstruation. (4) In a study done by Sigdel et al. 75% participants had decrease in physical activity, 65.4% had irritation and 38.1% reported missing school due to dysmenorrhea. (6) Another study done in Nepal also reported 29.45% of participants missing of college days due to dysmenorrhea.(5)

Several studies have been conducted to find various risk factors associated with PD like age, smoking, early menarche, low and high body mass index (BMI), pre-menstrual syndrome and family history.(4,11-15) But the results have varied and sometimes contradictory. (13,14) Hence, the study aimed to find the prevalence and risk factors associated with primary dysmenorrhea in young college students and also aimed to find the impact of severity of dysmenorrhea in daily activities of participants.

METHODS

This was a cross sectional study conducted from 28 November 2023 to 27 May 2024 in laboratory of Clinical Physiology at Maharajgunj Medical Campus among undergraduate students from Maharajgunj Medical Campus and Maharajgunj Nursing Campus.

Sampling method

A total of 165 participants were selected from convenient sampling method. The sample size was calculated based on the prevalence of dysmenorrhea among nursing students in Nepal. The prevalence of dysmenorrhea was reported to be 80.7% in sample size of 140 nursing students.16 The sample size formula used was based on proportion with margin of error 6% and confidence interval of 95%. Prevalence: 80.7%; Zα= Z score for confidence interval (at 95%) = 1.96, p= population proportion= 0.8, n= sample size =140

Em = $1.96\sqrt{0.8(1-0.8)/140}$ $=1.96\sqrt{0.0011}$ =1.96 X 0.03316 = 0.064

Required sample size was calculated (N): Zα2.p(1-p)/ Em2 =150 + 10% additional non response rate =165

Study variables

The study considered severity of primary dysmenorrhea and its effect on daily activities, behavioral changes, effect on mental health and skipping of college as the dependent variable. The age of menarche, premenstrual syndrome, family history, body mass index, waist circumference and waist to hip circumference ratio were considered as independent variables.

Data collection

Female participants between the ages of 18 to 24 years were included and those with known history of secondary dysmenorrhea, history of chronic disease including psychiatric disease and on any type of hormonal and long-term medication were excluded from the study. Data was collected by questionnaires from the participants. The Questionnaire was designed according to similar studies done in primary

Dysmenorrhea.(11-13,15,17-21) The Content validity was done by face validity by two professional experts and changes were made in questionnaire according to the suggestions made by them. A pretest was conducted on 25 students to check internal validity.

Anthropometric measurements such as height, weight, waist circumference and hip circumference were measured in standing position according to guidelines given by WHO and categorized according to WHO Guidelines.(22) Body Mass Index (BMI) was calculated and classified according to World Health Organization guidelines.(22) Pain was categorized by Numerical Rating Scale-11.(17) Pre-menstrual symptoms were diagnosed by guidelines given by Yonker KA et al.21 Dysmenorrhea was classified according to guidelines given by Multi-dimensional Scoring System of Andersch and Milson.(23)

Statistical analysis

Data were analyzed by using SPSS-version 26. Chi Square test was used to associate the risk factors with primary dysmenorrhea among the participants and also to know its impact on daily activities. P value of <0.05 was considered statistically significant.

Ethical consideration

The safety consideration, privacy and confidentiality were of utmost priority. The participants were informed about the research verbally and an information sheet in English and Nepali was provided. After enrolling in the research study, participants were asked to sign on a consent form. Participation was voluntary and they were allowed to drop out from the study at any time. The participants provided a brief medical history. Height, weight, waist circumference and hip circumference were measured by female researcher in presence of a female

attendant. Participants filled up the questionnaire. Participants were identified by serial number and no name was given in the questionnaire. There was no risk involved for the participants during the research. Study was conducted after getting permission from Ethical Review Board, Tribhuvan University, Kirtipur (ERB decision number- ERBTU- 080-024) and Institutional Review Committee, Institute of Medicine, Maharajgunj, Kathmandu [440(6-11) E2].

RESULTS

A total of 165 female students of Maharajgunj Medical Campus and Maharajgunj Nursing Campus were included in the study. The mean age of the participants was 20.30 years with Standard Deviation (SD) of ±1.5 years. The minimum age was 17 years and maximum age was 24 years. Among participants Brahmin and Chhetri consisted of 65.5% (n=108), Janajati was 19.4% (n=32) , Madhesi was 10.90% (n= 18) and Dalit was 4.2% (n=7).

The minimum age of menarche among participants was 10 years and maximum age of menarche was 16 years. The mean age was 12.8 years with standard deviation of 1.14 years (Table 1).

Table 1. Risk factors among the participants

Risk factors	Categories	Frequency (%)
Age at menarche	Early menarche (<12 yrs)	23 (13.9)
	Normal (12-14 yrs)	134 (81.2)
	Late menarche (>14 yrs)	8 (4.8)
Family History of dysmenorrhea	Present	41 (24.8)
	Absent	124 (75.2)
Pre- menstrual Symptoms	Present	117 (70.9)
	Absent	48 (29.1)
Waist Circumference	Normal (<80 cm)	155 (93.9)
	High Risk (≥80 cm)	10 (6.1)
Waist-Hip Ratio	Normal (<0.80)	157 (95.15)
	High Risk (>0.80)	8 (4.84)
Body Mass Index	Underweight (<18.5)	28 (17)
	Normal weight (18.5-24.9)	114 (69.09)
	Pre- obesity (25.0-29.9)	19 (0.11)
	Obesity (>30.0)	4 (2.4)

The prevalence of PD was very high 98.2% among the participants (Figure 1).

There was no significant association found between the risk factors like early age of menarche, family history and anthropometric parameters like waist circumference, waist-hip ratio and BMI with severe PD (p>0.05). But there was statistically significant association seen between pre-menstrual syndrome and severity of PD (<0.001)(Table 2).

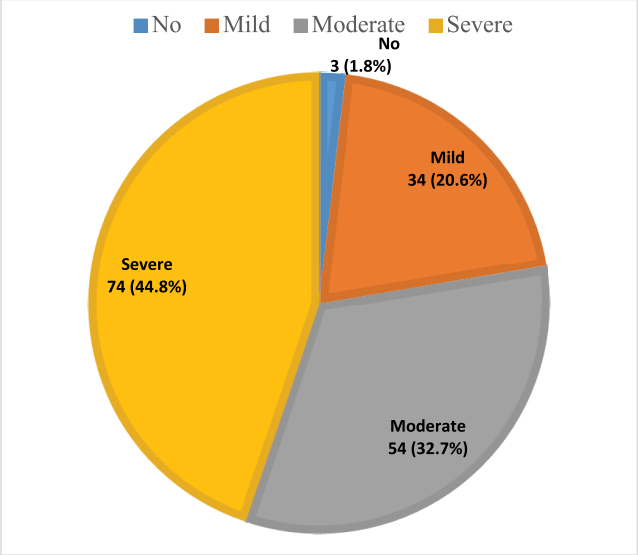

Figure 1. Severity of primary dysmenorrhea in participants

Severity of dysmenorrhea significantly limited the daily activities of the participants and caused behavioral changes, affected their mental health and caused skipping of college (Table 3).

DISCUSSION

In this study the prevalence of primary dysmenorrhea was very high among the participants (98.2%). Several studies have shown very high prevalence of PD and those who seek medical treatment are just a tip of an iceberg.(3-7,16) In this study severe dysmenorrhea was found in 44.8%, 32.7 % had moderate dysmenorrhea, 20.6% had mild dysmenorrhea and 1.8% had no dysmenorrhea. High prevalence of PD shows huge number of young female population suffering from PD. Thus, various studies have shown high prevalence despite of different socio-economic backgrounds.(3-7)

This study showed statistically significant correlation of pre-menstrual syndrome (PMS) with severity of primary dysmenorrhea (p value <0.001, OR: 3.603,CI: 1.675- 7.752). Pre-menstrual syndrome is physical discomfort and mood changes in week before menstruation which can significantly change their day-to-day activity. The psychological and mood changes are major constituent of PMS. Gonadal steroids are considered to be involved in pathophysiology of PMS. (21) In study done by Ugarriza et al 40% of women of child bearing age had PMS of some form and 10% had severe form of PMS.(24) Many other studies have found this correlation hence support findings of this study. In a study done by Babapour F et al. in 900 high school students in North Iran, 33.9% had moderate or severe PMS.(25) The prevalence of PMS in this study seems to be higher than data from other country but similar studies done in same population of Nepal have given

similar prevalence like study done by Mahat A et al. which was 64% and Shrestha DB et al. on 285 students of medical college in which 72.3% had at least one PMS symptom of moderate to severe intensity.(26,27) The study done by Shrestha DB et al. also found PMS to be significantly correlated with severity of PMS. (p value=0.001).(27)

Table 2. Association of risk factors with the severity of primary dysmenorrhea among the participants

Risk factors	Categories	Mild PD (%)	Moderate- Severe PD (%)	p value	Odds ratio (CI)
Age at menarche	Early menarche (<12 yrs)	5 (21.7)	18 (78.3)	0.932	0.955 (0.329-2.773)
	Normal- Late menarche (≥12 years)	32 (22.5)	110 (77.5)		
Family History	Present	5(12.2)	36 (87.8)	0.070	2.504 (0.905-6.933)
	Absent	32 (25.8)	92 (74.2)		
Pre-menstrual Symptoms	Present	18 (15.4)	99 (84.6)	<0.001	3.603 (1.675-7.752)
	Absent	19 (39.6)	29 (60.4)		
Waist circumference	Normal	35 (22.6)	120 (77.4)	0.850	1.167 (0.237-5.747)
	High Risk	2 (20.0)	8 (80.0)		
Waist Hip Ratio	Normal (<0.80)	35(22.3)	122 (77.7)	0.858	0.861(0.166 -4.454)
	High Risk (>0.80)	2(25.0)	6 (75.0)		
Body Mass Index	<18.5	7 (25.0)	21 (75.0)	0.720	0.841 (0.326-2.167)
	≥18.5	30 (21.9)	107 8.1)		

Table 3. Association of different impacts with the severity of dysmenorrhea

Impacts	Categories	Mild PD (%)	Moderate- Severe PD (%)	p value	Odds ratio (CI)
Limit in daily activities	Present	13 (35.1)	99 (77.3)	<0.001	6.302(2.855-13.911)
	Absent	24 (64.9)	29 (22.7)		
Behavioral change	Present	23 (62.2)	104 (81.3)	0.015	2.638(1.186-5.864)
	Absent	14 (37.8)	24 (18.8)		
Effect on Mental Health	Present	6 (16.2)	67 (52.3)	<0.001	5.675(2.216-14.534)
	Absent	31 (83.8)	61 (47.7)		
Skipping College	Present	3 (8.1)	60 (46.9)	<0.001	10.00 (2.922-34.27)
	Absent	34 (91.9)	68 (53.1)		

This study could not find any significant association between early age of menarche and severity of PD. (p value= 0.579). There are studies which have shown similar results like our study. In a study done by Unsal A et al. in Western Turkey in 623 females, no association was seen between age of menarche with severity of dysmenorrhea. (p value=0.142).(15) However, there are studies that show association of early age of menarche with PD.(10,13,28,29) Similarly, in a study done by Harita M et al. early menarche and heavy flow were associated with PD whereas irregular cycles showed less chances of PD.(10) So, the age of menarche may not be only factor that determines severity of PD. Our study did not find any correlation between family history and severity of dysmenorrhea (p value =0.070). In study done by Ju et al. family history had strong correlation and increased risk of PD.(2) The difference in result may be due to other confounding factors such as social and financial factors which have been not been studied by the research. In this study no association was found between BMI and severity of dysmenorrhea. (p value =0.720). There are other studies which have shown similar results like this study as one done by Khodakarami et al in 579 young adolescent girls in Hamada, Iran in which girls with normal weight showed higher frequency and severity than high and low BMI and no statistically significant correlation was found between two parameters.(13) In study done by Pakniat H et al in 400 students in Iran with prevalence of PD 82.5%, no association was found between BMI and PD (p value=0.765).30 Similarly, in study done by Haidari F et al in Iran, no statistically significant relation was found between BMI and PD.(31) Contradictorily some studies have in fact found the association between these two parameters. In a prospective study done in a large population in Australian females (n= 9688) for 13 years by Ju H et al a U shaped relation was found with statistically significant relation seen in underweight (OR 1.34 , 55 confidence interval (CI) 1.15,1.57) and obese (OR 1.22, 95% CI 1.11,1.35).(2) Similar results were seen in study done by El Kosery SM et al in which both low and high BMI showed association with PD (p=0.001). (19) A study done by Baidya et al in 375 students in Dang Nepal in which Low BMI group had PD (75.2%). (11) Similarly study done by Chauhan M et al which

also showed association of low BMI with PD (p value <0.001).(32) But study done by Takata K et al showed women with high BMI had severe dysmenorrhea [n = 278; 23.3 ± 4.5 (standard deviation) kg/m2].(33) Due to various contradictory research findings by various studies, the relationship between two parameter remains controversial hence study with larger sample size to get more authentic results is suggested. The current study did not show statistically significant correlation of other anthropometric parameters like waist circumference (p value= 0.850) and waist hip ratio with severity of PD (p value= 0.858). In study done by Rad M et al. in 200 high school students in Sabzevar significant correlation was seen of PD with anthropometric indices like waist circumference (p value = 0.03) and waist circumference by hip circumference ratio (p value=0.04).(20) But again in a study done by Pakniat H et al, there was no association of PD with waist circumference (p value= 0.938) where are waist hip ratio was found to be a predictive protective factor for dysmenorrhea (OR = 0.896, CI95% = 0.821 - 0.971, p value = 0.012). Height was however found to be a risk factor (OR = 1.057, CI95% = 1.006 - 1.111, p value< 0.001).(30)

Furthermore, this study showed statistically significant correlation of severity of PD with limit in daily activities of the participants (p< 0.001, OR:6.302, CI: 2.855-13.911), caused behavioral changes (p value=0.015, OR: 2.638, CI: 2.855-13.911) and had effect on mental health (p value<0.001, OR:5.675,CI: 2.216- 14.534). Severity of PD also had statistically significant correlation with skipping college during menstruation (p value<0.001, OR:10.00, CI: 2.992-34.227). Many other studies have also found the significant effect of severity of PD on daily life activities, health perception, school absence and which eventually affects productivity.(4,15,28,34) Thus, this study adds up to the evidence of impact of severity of PD on daily life activities and its effect on emotional and mental health of young girls suffering from it and on absence from academic activities resulting in poor academic performance.

However, there are few limitations of the current study. The study was conducted in single center which may not be a representation of the general under-graduate female students of Nepal. Another limitation is that the pain score was given subjectively and on recall basis so more objective method of pain evaluation can be incorporated in future studies. Hence, we would like to recommend further study with larger sample size which could give better picture of PD and its risk factors.

CONCLUSION

This study concluded that there was high prevalence of primary dysmenorrhea in young female undergraduate students and also showed pre-menstrual syndrome as an important risk factor for primary dysmenorrhea. However, primary dysmenorrhea was not significantly associated with other risk factors such as early age of menarche, positive family history for dysmenorrhea and anthropometric parameters like BMI, waist circumference and waist – hip ratio. Primary dysmenorrhea had major negative impact on their daily activities and caused behavioral changes. It also affected their mental health and caused skipping of college. Furthermore, more researches with larger sample size is recommended to explore other risk factors of PD.

Conflict of Interest

The authors declare no conflict of interest.

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