Severity and relation of primary dysmenorrhea and body mass index in undergraduate students of Karachi: A cross sectional survey

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Abstract

Objective: To determine the frequency of primary dysmenorrhea and its association with body mass index in female students.

Methods: The cross-sectional study was conducted from January to March, 2018, in two districts of Karachi, and comprised female undergraduate students aged 15-25 years who had reached menarche at an appropriate age. A semi-structured questionnaire was used to assess dysmenorrhea while Seca scale was used for nutritional status. The association between body mass index and dysmenorrhea was worked out statistically using SPSS 23.

Results: Of the 410 students approached, 384(93.6%) responded. They had a mean age of 21±5.2 years. Dysmenorrhea was mild in 150(39%) subjects, 145(37.8%) moderate and 89(23.2%) severe. Overall, 273(71.1%) subjects had reached menarche aged 8-13 years. Dysmenorrhea was associated with radiating pain in 265(69%) and vomiting in 111(28.9%) subjects. Nutritional status was normal in 235(61.2%) subjects, 88(22.9%) were underweight, and 61(15.9%) were overweight and obese. Significant difference was observed in dysmenorrhea among underweight students ($p<0.05$). Age ?21 years also had a significant association with dysmenorrhea ($p<0.05$).

Conclusion: Dysmenorrhea was found to have a significant association with body mass index and age.

Keywords: Primary dysmenorrhea, Body mass index, BMI, Students, Pakistan. (JPMA 70: 1299; 2020)

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Introduction

Dysmenorrhea is one of the most common conditions among women of reproductive age, and affect up to 50% of the menstruating women around the world.[1] This condition is a public health issue as it can hinder with regular activities and has a major influence on women's quality of life as well as on their social and occupational roles, and results in significant work and school/college absenteeism.[2-4] Primary dysmenorrhea is the foremost gynaecological problem among menstruating women.[1] Globally, there is a variety in the estimation of dysmenorrhea from 28% to 71% in different studies.[5] Moreover, around 2-29% of the women of child-bearing age complain of severe pain during menses.[6] Many studies have reported high prevalence rate of primary dysmenorrhea, including up to 80% in young western Australian women.[6] Another study in Turkey reported a high prevalence rate of 66.9%.[2]

Primary dysmenorrhea is a multifactorial condition and majority of the factors are modifiable.[6-8] These factors include a younger age, low body mass index (BMI), smoking, early menarche, prolonged or irregular menstrual flow, history of pelvic infections, history of sterilisation, somatisation, psychological disturbance, genetic correlation and a history of sexual abuse contributing to the severity of dysmenorrhea.[7,8]

Obesity is one of the leading causes of morbidity and mortality worldwide. Obese women are at a higher risk of developing non-communicable diseases, including type 2 diabetes mellitus (T2DM), cardiovascular diseases and gynaecological problems, including sub-fertility, menstrual dysfunction and polycystic ovarian disease.[9,10] Recent evidence has suggested that most of the menstrual disorders are associated with obesity and BMI. The plausible explanation for this association is that the deposition of fat cells in the body start producing a hormone oestrogen, which interrupts the normal menstrual cycle and ovulation.[2,3]

The Australian Longitudinal Study on Women's Health (ALSWH) with 14247 women aged 18-23 years reported significantly increased odds ratio (OR) of dysmenorrhea for both women who were underweight (OR: 1.34, 95% confidence interval [CI]: 1.15, 1.57) and obese (OR: 1.22, 95% CI: 1.11, 1.35)[11] compared to women of normal weight. A 2012 study in India found significant increase in prevalence in the low BMI group.[10] A study conducted in

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Iran on female undergraduate students (n=200) showed significant difference between the presence of dysmenorrhea and anthropometric indices at height.[12] A study from Tamil Nadu in India (n=399) reported a four-fold increase in the prevalence of menstrual irregularities with the increase in body fat when compared with women of normal weight ($p<0.05$).[13] However, a few studies have reported found no significant association with increased BMI.[14]

In Pakistan, literature in this regard is scarce. A study conducted on female adolescents in 5 schools (n=401) reported menstrual irregularities among girls having inadequate nutritional status.[15] Statistically significant relationship was found between BMI and dysmenorrhea ($p<0.001$). However, the age group in the study was limited to 14-15 years.[15] The current study was planned to determine the prevalence of primary dysmenorrhea and its association with BMI in undergraduate students.

Subjects and Methods

The cross-sectional study was conducted from January to March, 2018, in two districts of Karachi. After approval from the ethics review committee of Jinnah Medical and Dental College (JMDC), Karachi, the sample size was calculated using World Health Organisation (WHO) calculator with 95% confidence level, 0.05 absolute precision, anticipated proportion 0.50 and OR 1.216. Using non-probability convenience sampling, two private high schools — Happy Home School and Little Folks Secondary School — situated in district East, and two medical colleges — Jinnah Sindh Medical University in district south and JMDC in district east — were approached and permissions were taken from the institutional heads. Within each institution, consecutive sampling was employed to the raise the sample. Those included were female undergraduate students aged 15-25 years who had reached menarche at an appropriate age. Married females and girls with any underlying pelvic pathology were excluded. Informed written consent was taken from each individual before handing them the data-collection form. Those who were not comfortable filling out the questionnaire in English language were also excluded.

The semi-structured self-reporting questionnaire was adopted from literature.[10-14] The operational definition of dysmenorrhea used was, "a painful menstruation of sufficient magnitude so as to incapacitate day-to-day activities".[17] Study variables explored by the questionnaire included age, marital status, pelvic pathology, age at menarche, regularity of menstrual cycle, abdominal cramps, its relation and radiation, any associated symptoms and preference of cold showers and spicy or sour food. In addition, pain frequency and intensity was inquired about through visual analogue scale (VAS), which ranged from 0-10, increasing in severity, with proper explanation as to what mild, moderate and severemeant.[18]

Moreover, the nutritional status of the students was assessed by measuring height and weight through Seca scale and weighing scale respectively. The BMI was calculated manually through the general formula of weight in kg divided by height in m^2. The BMI was categorised into Asian classification as; under-weight ($<17.5 kg/m^2$), normal (17.5-22.9 kg/m^2), over-weight (23-27.9 kg/m^2) and obese ($\geq 28 kg/m^2$) for analysis.[19] Statistical analysis was done using SPSS 23. Inferential statistics were performed using Chi-Square test to determine the association of age and BMI with dysmenorrhea. $P<0.05$ was considered significant.

Results

Of the 410 students approached, 384(93.6%) responded.

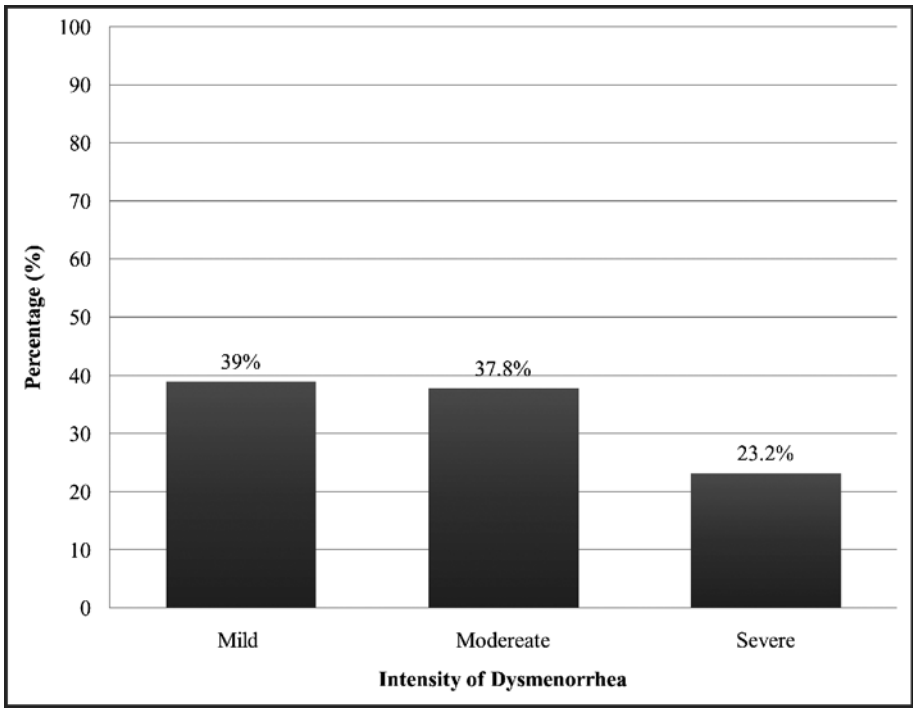

Figure: Frequency and intensity of dysmenorrhea among undergraduate students in Karachi (n-384).

Table-1: Frequency distribution of menstrual cycle details, primary dysmenorrhea associated symptoms and nutritional status among female students in undergraduate students in Karachi (n=384).

Characteristics	Frequency (N)	Percentage (%)
Age (years)		
<21	243	63.3
≥21	141	36.7
Age at menarche (years)		
<8	2	5
8-13	273	71.1
>13	109	28.4
Days of bleeding		
<4	76	19.8
4-7	288	75.0
>7	20	5.2
Duration of menstrual cycle (days)		
<24	59	15.4
24-32	275	71.6
>32	50	13.0
Relation of pain to cycle		
A day before	155	40.4
First or second day	229	59.6
Radiation of pain to back or thigh		
Yes	265	69
No	119	31
Nausea or vomiting		
Yes	111	28.9
No	273	71.1
Consumption of spicy food		
Yes	229	59.6
No	155	40.4
Opt for cold showers		
Yes	162	42.2
No	222	57.8
Nutritional Status (Body Mass Index)[1]		
Underweight	88	22.9
Normal	235	61.2
Overweight and obese	61	15.9

BMI= underweight <17.5 kg/m^2; normal 17.5-22.9 kg/m^2; overweight and obese ≥23kg/m^2.

They had a mean age of 21±5.2 years. Overall, 273(71.1%) subjects had reached menarche aged 8-13 years (Table-1). BMI was normal in 235(61.2%) subjects, 88(22.9%) were underweight, and 61(15.9%) were overweight and obese (Table-2).

Dysmenorrhea was mild in 150(39%) subjects, 145(37.8%) moderate and 89(23.2%) severe. Dysmenorrhea was associated with radiating pain in 265(69%) and vomiting in 111(28.9%) subjects (Figure)

Of the 88(22.9%) underweight girls, 29(33%) experienced mild pain, 27(30.7%) experienced moderate pain and 32(36.4%) experienced severe pain. Of the 235961.2%) normal BMI girls, 95(40.4%) each experienced mild and moderate pain and 45(19.1%) experienced severe pain. Of the remaining 61(15.9%) overweight and obese girls, 26(42.6%) experienced mild dysmenorrhea, 23(37.7%) experienced moderate dysmenorrhea and 12(19.7%) had severe pain.

Table-2: Association of each age and BMI group having Dysmenorrhea (n=384).

Characteristic	Mild n (%)	Moderate n (%)	Severe n (%)	p value
Age (in years)				
<21	96 (39.5)	81 (33.3)	66 (27.2)	
≥21	54 (38.3)	64 (45.4)	23 (16.3)	0.02
BMI (kg/m^2)				
Underweight	29 (33.0)	27 (30.6)	32 (36.4)	
Normal	95 (40.4)	95 (40.4)	45 (19.2)	0.02
Overweight & obese	26 (42.6)	23 (37.7)	12 (19.7)	

*p<0.05 significant BMI: Body mass index.

Significant difference was observed in dysmenorrhea among underweight students (p<0.05). Age ≤21 years also had a significant association with dysmenorrhea (p<0.05).

Discussion

According to the findings, the severity of dysmenorrhea was higher in the underweight category, which means these underweight girls experienced much more severe pain compared to the girls of normal and overweight BMI. This finding was consistent with the findings of other regional and international studies.[10,20] Literature suggested that underweight and malnourished women as well as overweight and obese women are prone to developing chronic disorders. Perhaps dysmenorrhea is yet another disease that is more likely to affect women's health through modifiable risk factors.[8-12] Underweight women may restrict their calories, resulting in nutritional deficiencies and hindering bodily functions. In contrast, obese women may overload calories and neglect to get enough exercise which also affects normal physiological processes. On the other hand, in our study the girls under the normal BMI experienced mild and moderate pain. This could be due to a much stronger and prolonged impact of the ovarian functions or the underweight girls may have an under lying condition that correlates the two factors.[11]

The endocrine control of menstruation is a composite interaction which may vary for underweight, normal and obese women. The theories for this are many, like

body weight directs oestrogen metabolism in such a manner that oestrogen made in thin girls is less potent compared to that in the rest, or that there has been an inverse relation between BMI and total oestrogen, suggesting that oestrogen/progesterone ratio is responsible for dysmenorrhea rather than oestrogen alone.[21,22] In addition, adipose tissues release adipokines which through the hypothalamic-pituitary-ovarian axis signalling can impair the ovarian function, resulting in disturbed menstruation. Disturbed menstruation is evidently higher in low and high BMI girls, and dysmenorrhea does result from menstrual irregularities.[23] Moreover, an intake of low caloric count and fat mass disturbance may disrupt the pulsatile secretion of pituitary gonadotropins which ultimately has an effect on the rate and severity of dysmenorrhea.[24]

There is evidence which conjectures that oestrogens control chronic pain through the concentration of oestrogen receptors in the nervous system through which they interact with neurotransmitters associated with pain perception.[25] It is proposed that low oestrogen concentration may aggravate chronic pain which could support the association of dysmenorrhea and low BMI.

The strength of the current study include its design and adequate sample size. Secondly, high school, college and university students were targeted to increase the age range. Also, the standardised Seca scale was used for measuring height, and weighing scale for BMI measurement. Finally, the use of Asian classification of BMI category[18] provides relevance to our context. However, the study has its limitations due to limited resources and time constraint. Firstly, non-probability sampling technique was used to select the institution and the participants and that limits the generalisability of the findings. Secondly, the data was collected through a self-reporting questionnaire which may have been affected by reporting bias. We were unable to explore more risk factors due to limited resources and used analogue method for the assessment of dysmenorrhea pain, which may have undermined the findings.

It is recommended that studied with more elaborate investigation, including all factors associated with body mass and weight, shall explore through longitudinal design. Nutritional intervention and health awareness among female students should be conducted routinely.

Conclusion

Dysmenorrhea was found to have a significant association with BMI and age. BMI, being a modifiable entity, can be controlled, and awareness in this regard shall be spread via health education campaigns and curriculum designing to improve reproductive health.

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Conflict of Interest: None.

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