Association between body mass index and dysmenorrhea among medical students: A cross-sectional study

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Background and Aim: The etiology of menstrual disorders such as dysmenorrhea, premenstrual symptoms, menorrhagia, polymenorrhea, abnormal vaginal bleeding, amenorrhea, oligomenorrhea, and irregular menstruation among the can be due to various psychological as well as organic causes. This study was conducted to assess the menstrual pattern in young adult females. **Material and Methods:** A cross-sectional study was conducted among female MBBS students and interns of Gujarat Adani Institute of Medical Science Bhuj, Kutch, Gujarat, India. Data was collected in a semi-structured questionnaire that was administered to all undergraduate female medical students in the age group of 18-25years. The questionnaire consisted of details regarding the menstrual history- the duration and amount of flow of the recent three menstrual cycles, associated symptoms like dysmenorrhoea, leg cramps, and any other bodily changes like weight gain, hair growth, etc was taken. These students' anthropometric measurements such as height, weight BMI, any signs of hirsutism, or androgenic were recorded. **Results:** 2.9% of the students had polymenorrhoea. Oligomenorrhoea was found in 14% of participants. The length of the menstrual interval was normal (i.e. 21-35 days) in 76% of the students whereas 6.8% of students had an irregular menstrual cycle. It was found that a high percentage (66.6%) of students who were overweight/obese were reportedly suffering from dysmenorrhea. Whereas lesser percentage underweight (44.7%) and normal weight (55.5%) students were reportedly suffering from dysmenorrhea. **Conclusion:** Early diagnosis and management of dysmenorrhea should be done and appropriate necessary lifestyle modification should be encouraged among young females to reduce the incidence of PCOD and metabolic syndrome later in life.

Keywords: Amenorrhea, Dysmenorrheal, Menstrual cycle, Obese

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Introduction

The menstrual cycle is the physiological phenomenon, consisting of cyclical shedding of the endometrium, occurring on an average of 28 ± 7 days in every woman's life in response to hormones during their reproductive years. An average blood loss of 50 ± 30 ml occurs in every menstrual cycle which lasts for about 5 days, accounting for around 67 months of menstrual bleeding over a lifetime of a female [1,2]. The production of hormones from the hypothalamus (gonadotropin-releasing hormone), pituitary (follicle-stimulating hormone and luteinizing hormone), and ovaries (progesterone and androstenedione, etc.) are regulated by positive and negative feedback mechanisms. The interaction and the levels of these hormones regulate the duration and regularity of the menstrual cycles [1-5].

The etiology of menstrual disorders such as dysmenorrhea, premenstrual symptoms, menorrhagia, polymenorrhea, abnormal vaginal bleeding, amenorrhea, oligomenorrhea, and irregular menstruation among the can be due to various psychological as well as organic causes. The increased levels of stress can affect the hormonal milieu, thereby affecting the menstrual cycles [5]. There are various types of menstrual disorders, including dysmenorrhea, premenstrual symptoms, menorrhagia, polymenorrhea, abnormal vaginal bleeding, amenorrhea, oligomenorrhea, and irregular menstruation.

Dysmenorrhea is defined as a severe, painful, cramping sensation in the lower abdomen occurring just before or during the menses [6]. It is a common gynecological complaint, affecting the majority of women of reproductive age with 2–29% having severe pain [7]. As a debilitating condition, it has a major impact on women's health-related quality of life and social and occupational roles, resulting in significant work and school absences [8,9].

Considerable economic losses due to dysmenorrhea were estimated resulting from decreased productivity, costs of medications, and medical care [10]. Dysmenorrhea might also be accompanied by nausea, malaise, low back pain, or flank pain [11]. As a debilitating condition, it has a major impact on the quality of life, social, and occupational roles of females. Dysmenorrhea is one of the leading causes of repeated absenteeism in girls from schools and colleges.

Data from various studies conducted earlier show that absenteeism from school due to primary dysmenorrhea is 34-50% [12,13]. Dysmenorrhea is divided into two types: Primary dysmenorrhea and secondary dysmenorrhea. Primary dysmenorrhea is the one, in which there is cramping pain in the lower abdomen at the onset of menstruation in the absence of any identifiable pelvic disease; secondary dysmenorrhea, on the other hand, refers to painful menses resulting from an identifiable pelvic pathology such as fibroid, adenomyosis, and pelvic inflammatory disease [14].

There are various reports regarding the impact of body mass index (BMI) on dysmenorrheal [15,16]. Several studies have indicated various physiological, cultural, and psychological factors are involved in dysmenorrhea. In addition, inappropriate nutritional diet, lower age, obesity, family history, and reduced frequency of breakfast meals per week are factors affecting the frequency of this problem [17,18]. There is a high prevalence of dysmenorrhea in the female of our society; so, it is necessary for us to clarify factors associated with dysmenorrhea in adolescents to improve their quality of life.

The medical students endure a relatively greater amount of stress due to the vast subject which is to be studied during their MBBS course. The medical students also lack sufficient outdoor physical activity. A high prevalence of irregularity of periods among them if undetected in early stages can lead to polycystic ovarian disease which is one of the causes of infertility. The menstrual characteristics (the menstrual cycle bleeding patterns, length, etc.) are important indicators of endocrine and uterine dysfunctions/abnormalities like Polycystic Ovarian Disorders. Therefore, this study was conducted to assess the menstrual pattern in young adult females.

Materials and Methods

Study Design, Study setting, and Study Population- A cross-sectional study was conducted among female MBBS students and interns of Gujarat Adani Institute of Medical Science Bhuj, Kutch, Gujarat, India. Data was collected in a semi-structured questionnaire which was administered to all undergraduate female medical students in the age group of 18-25years, after explaining the purpose of the study.

Ethical Approval and Informed Consent- Ethical approval was taken from the institutional.

Ethical committee and written informed consent was taken from the study participants

Exclusion criteria- Exclusion criteria consisted of students who were married, those students who were on hormonal medication and primary amenorrhoeic females. A total of 204 female students participated in this study.

The questionnaire consisted of details regarding the menstrual history- the duration and amount of flow of the recent three menstrual cycles, associated symptoms like dysmenorrhoea, leg cramps, and any other bodily changes like weight gain, hair growth, etc was taken. These students were later clinically examined by OBG specialist and their anthropometric measurements such as height, weight BMI, any signs of hirsutism or androgenic were recorded.

Statistical analysis- The data was coded and entered into a Microsoft Excel spreadsheet. The analysis was done using SPSS version 15 (SPSS Inc. Chicago, IL, USA) Windows software program. The variables were assessed for normality using the Kolmogorov-Smirnov test. Descriptive statistics were calculated.

Results

A total of 250 female students who met the inclusion criteria participated in the study. The average age of the students was 22.2 ± 2.5 years. 2.9% of the students had polymenorrhoea. Oligomenorrhoea was found in 14% of participants. The length of the menstrual interval was normal (i.e. 21-35 days) in 76% of the students whereas 6.8% of students had an irregular menstrual cycle.

Table-1: Menstrual cycle characteristics among the participants.

Menstrual cycle characteristics	No of students (n)	Percentage (%)
Menstrual interval		
<21 days	8	3.2
21-35 days	190	77
>35 days	35	14
Irregular	17	6.8
Total	250	100
Duration of bleeding		
<3	25	10
3-6	190	76.0
>6	30	12
>10	5	2
Total	250	100

Table-2: Distribution of the participant students according to their BMI.

BMI (Kg/mt2)	Number of students (N=204)	Percentage (%)
<18.5	85	34
18.5-24.99	135	54
≥25	30	12
Total	250	100

Table-3: Association of BMI with dysmenorrhea.

BMI (Kg/mt2)	Dysmenorrhea presentn (%)	Dysmenorrhea absent n (%)	Total n (%)
<18.5	38 (44.7%)	47 (55.2%)	85 (100.0%)
18.5-24.99	75 (55.5%)	60 (44.4%)	135 (100.0%)
≥25	20 (66.6%)	10 (33.3%)	30 (100.0%)
Total	133 (53.2%)	117 (46.8%)	250 (100%)

The bleeding period varied from 1 to 12 days in the last three menstrual cycles in the study population. 10% of students had a duration of bleeding of fewer than 3 days while a maximum of 76 % had a normal duration of bleeding of 3-6 days. 12% had a duration of bleeding of more than 6 days while 2.0% of students reported having bleeding for more than 10 days in the last three cycles.

In the present study, a majority of the students were in the normal weight range. 12% of the students were overweight/obese (Table 2). A Chi-square test was applied to test the association of dysmenorrhea with body mass index among the participants. It was found that a high percentage (66.6%) of students who were overweight/obese were reportedly suffering from dysmenorrhea. Whereas lesser percentage underweight (44.7%) and normal weight (55.5%) students were reportedly suffering from dysmenorrhea. This association was found to be statistically significant (Table 3).

Discussion

Menstruation is a natural phenomenon in women after puberty and is often associated with dysmenorrhea. Earlier studies have demonstrated an association between BMI and the incidence and severity of dysmenorrhea. Dysmenorrhea usually develops within hours of the beginning of menstruation and increases as the flow becomes maximum during 1st or 2nd day.

The etiology and pathophysiology of primary dysmenorrhea are not fully known, but most symptoms are by the action of uterine prostaglandins (PG), particularly PGF2α, which are released from the disintegrated endometrial cells as menstruation begins. The PGF2α stimulates myometrial contractions, ischemia, and sensitization of nerve endings. The evidence of this theory is that women with more severe dysmenorrhea have higher levels of PGF2α in their menstrual blood. Some studies have also shown possible increased levels of leukotrienes and vasopressin [19,20].

There is also the presence of positive family history in the case of dysmenorrhea. Several studies have shown an increased prevalence of dysmenorrhea in the low BMI group [21,22]. Low caloric intake, body weight, and fat mass disturb pulsatile secretion of pituitary gonadotrophins leading to an increase in the rate of dysmenorrhea. Dysmenorrhea has an impact on the daily activities of adolescent females.

In the present study, irregular cycles were seen in 6.8% of students (Table 1) which is lower than in a study done by Dambhare DG et al among adolescent girls [23]. This could be because the present study was done in the age group of 18-25 years. By that time, the body gets adjusted to the hormonal changes of puberty [24]. Less prevalence of overweight/obesity might be the reason for the low incidence of menstrual irregularities and PCOD in the present study group (Table 2).

In the present study, it was found that the length of the menstrual interval was normal i.e. 21-35 days in 77% of the students (Table 1) which is comparable to a study done by Gayatri G et al [4]. The mean duration of menstrual flow in the present study was 4 days which is similar to the studies conducted by Dambhare DG et al and Nusrat N et al [23,25].

In the present study, the age at attainment of menarche was reported to be at less than 16 years of age among all participants and hence none of them had primary amenorrhoea. None were morbidly obese. Around 2% of students had been diagnosed with PCOD according to ultrasonic evidence of PCOD in the present study.

The results are comparable with the study conducted by Nidhi R et al, whereas the study conducted by Kural M et al documented a higher prevalence of PCOD (22%) which, according to the author was due to the use of different diagnostic criteria, study settings and age group of the sample studied [26,27].

Less prevalence of obesity found in the present study group might be one of the reasons for the lower incidence of menstrual irregularities and PCOD [28].

In the present study, dysmenorrhoea was seen in a total of 53.2% of students. The study also showed a significant association of dysmenorrhea with overweight/obesity (Tables 2 and 3). Similar results are found in the study conducted by Chakrabarti M et al [29] Obesity is seen to be having close association with menstrual disturbances, dysmenorrhoea, and PCOD. And it is seen that even average diet modification and physical exercise is associated with marked improvement in metabolic and endocrine functions [30]. Rising trends in the prevalence of PCOS has become a great cause for health concern as it is increasing the incidence of metabolic syndrome [31].

In public health practice, quality of life is acknowledged as an indicator of health. Further, the level of awareness in these future health care professionals is another variable that must be investigated further.

The limitation of this study is the study cannot generalize to the whole population.

Conclusion

Lack of exercise and a sedentary lifestyle in young adults are increasing the incidence of menstrual abnormalities and PCOD, which ultimately increases the risk of metabolic syndrome. Early diagnosis and management of dysmenorrhea should be done and appropriate necessary lifestyle modification should be encouraged among young females to reduce the incidence of PCOD and metabolic syndrome later in life. Dysmenorrhea has a negative effect on health-related quality of life. It is a leading cause of school and college absenteeism. Dysmenorrhea is an important public health problem, so an attempt must be made to find out the cause of dysmenorrhea and provide health education so as to improve the quality of life in adolescent females.

What does the study add to the existing knowledge?

Intake of a balanced diet will assist them in improving quality of life and enabling them to mature into more socially and economically productive members of society. Dysmenorrhea has a negative effect on health-related quality of life.

It is a leading cause of school and college absenteeism. Dysmenorrhea is an important public health problem, so an attempt must be made to find out the cause of dysmenorrhea and provide health education so as to improve the quality of life in adolescent females.

Contribution from authors

Dr. Girija C Bellad: Formulated the aims and objectives with study design and helped in data collection from the medical record department.

Dr. Mahesweta Guru: Contributed to the preparation of the manuscript and data analysis.

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