e-ISSN: 0975-1556, p-ISSN:2820-2643
Available online on www.ijpcr.com
International Journal of Pharmaceutical and Clinical Research 2023; 15(10); 1629-1634

Original Research Article

Association of BMI and Other Menstrual Properties with Dysmenorrhoea

Archana Singhal

Associate Professor, Department of Obstetrics and Gynecology, Pacific Institute of Medical Sciences, Umarda, Udaipur

Received: 25-07-2023 / Revised: 20-08-2023 / Accepted: 22-09-2023
Corresponding Author:Dr. Archana Singhal
Conflict of interest: Nil

Abstract:

Introduction: Dysmenorrhea can be primary (no pelvic problems) or secondary (adenomyosis). Complex factors affect its prevalence. Prostaglandins, particularly PGF2alpha, induce uterine contractions and oral NSAIDs work. WHO uses BMI, despite its simplicity, to evaluate obesity. Dysmenorrhea is more common in women with body mass indexes (BMIs) below 20 kg/m2, but there is conflicting evidence for those with BMIs greater than 23.9 kg/m2.

Aim and Objectives: The objective is to examine the correlation between BMI, menstrual features, and the frequency of dysmenorrhea among female participants.

Method: This cross-sectional study, conducted from July 2022 to June 2023, involved 80 participants from the gynecology OPD with dysmenorrhea symptoms. Participants aged 18-25 completed a semi-structured questionnaire on menstrual history and symptoms. Anthropometric data and hirsutism symptoms were documented during clinical examinations. Pregnant participants and those with chronic disorders, especially thyroid issues, were excluded.

Result: The study revealed that the BMI distribution among 80 participants, indicating prevalent normal weight status (75.00%), followed by underweight (15.00%) and overweight/obese (10.00%). This data informs nutritional and health assessments, aiding in tailored interventions. Higher BMI correlates with prolonged menstrual bleeding (>6 days), emphasizing BMI's role in menstrual health. The study alsofound that the BMI influences menstrual cycle length, with lower BMI associated with shorter cycles and vice versa. Further research is required to understand underlying mechanisms.

Conclusion: The study has concluded that there is significant association between Body Mass Index (BMI) and the duration of menstrual bleeding and menstrual cycle length.

Keywords: Menstrual Cycles, Dysmenorrhea, Bleeding Diversity, Metabolic Syndrome Risk.

Introduction

Dysmenorrhea is a recurring ache in the lower abdomen or pelvis that may spread to the back or thighs and occurs during menstruation. The term dysmenorrhea originates from the Greek words "dys" meaning difficult, "meno" meaning month, and "rhea" meaning flow [1].

Dysmenorrhea is classified into both primary and secondary types. Primary dysmenorrhea is explained as the presence of spasmodic pain in the lower part of the abdomen that begins at the onset of menstruation, despite any identifiable pelvic problem. Primary is distinguished from secondary dysmenorrhea, characterised by painful menstrual periods caused by a specific pelvic condition such as adenomyosis, fibroid, pelvic inflammatory disease, etc [1].

The incidence of dysmenorrhea in women of reproductive age group has been seen to vary between 16% and 91%. The precise prevalence and severity of this issue are challenging to determine due to the dispute surrounding terminology and the complex interplay of reproductive, demographic, physiological, lifestyle, psychological, and socio-cultural factors [2].

The primary dysmenorrhea etiologic factor is not fully comprehended, but the majority of symptoms can be attributed to the effects of prostaglandins, specifically PGF2alpha, which is generated during the shedding of the endometrium. During the onset of menstruation, PGF2alpha triggers contractions in the muscles of the uterus, reduces blood flow, and increases the sensitivity of endings of the nerve. The empirical data substantiating this concept is exceedingly strong. Females with more intense dysmenorrhea display heightened amounts of PGF2alpha within their menstruation fluid. Furthermore, numerous research have showcased the remarkable effectiveness of NSAIDs, which function by inhibiting prostaglandin synthetase. Furthermore, certain investigations have suggested a potential association between elevated levels of

leukotrienes and vasopressin, although the precise nature of these relationships remains uncertain [3].

The body mass index, also known as the Quetelet index, is a statistical metric that assesses the relationship between a patient's weight and height. The Body Mass Index (BMI) is extensively employed as a diagnostic tool to diagnose obesity issues in a population due to its simplicity in calculation. The calculation of BMI is done by dividing a person's weight by a square of their height [3]

BMI fails to consider several elements such as body frame size, muscle mass, fat distribution, bone density, cartilage composition, and water retention. However, BMI can be computed rapidly and without the need for costly equipment. Therefore, the World Health Organisation (WHO) has used it as the benchmark for documenting obesity data since the 1980s. The World Health Organisation (WHO) classifies a body mass index (BMI) below 18.5 as underweight, which can indicate a nutritional deficiency, an eating disorder, or other health problems. On the other hand, a BMI above 25 is classified as overweight [4].

The association between obesity and dysmenorrhea has yielded inconsistent results, despite the well-established link between obesity and several negative reproductive health effects. A previous comprehensive analysis investigated the factors that increase the likelihood of women developing chronic pain, encompassing 63 papers specifically focused on dysmenorrhea. The study revealed a significant correlation between a BMI below 20 kg/m2 and dysmenorrhea, but no association was observed between a BMI above 23.9 kg/m2 and dysmenorrhea. Considerable variables were seen in the studies on the relationship between dysmenorrhea and a body mass index (BMI) of more than 23.9 kg/m2 [5].

Method

Research Design: This cross-sectional study was conducted among 80 participants who were presented in our hospital's gynaecology OPD with dysmenorrhea. This study was conducted from July 2022 to June 2023 in our hospital university. In order to conduct this study, patients from 18-25 years old were selected who were given a semi-structured questionnaire to collect data, after describing the study's goal and receiving informed consent. The questionnaire included information on period history, including duration and flow of the last three cycles, symptoms such as dysmenorrhea and leg cramps, and physical changes such as weight increase and hair growth. During clinical examinations, study authors documented anthropometric parameters such as height, weight, BMI, and symptoms of hirsutism or androgenism in these patients.

Inclusion and Exclusion

Inclusion

- Patients who visited the gynaecology OPD with dysmenorrhea.
- The patients whose BMI was measured.

Exclusion

- Patients with chronic underlying disorders, specially disorders of thyroid glands.
- Female who were pregnant at data collection were dropped as pregnancy may impact the menstrual cycle and other metrics.

Statistical Analysis

The study has used SPSS 27 for effective analysis. Data was collected in Excel and analysed. The discreet data was expressed as frequency while the continuous data was expressed as their mean and standard deviation. A summary statistic of N and a mean were utilised for continuous variables. When summarising categorical data, the numbers and percentages were utilised. The Chi-square test was used to assess the significance of categorical variable relationships. The level of significance was considered to be $P<0.05$.

Result

Table 1 provides data on the menstrual cycle characteristics of 80 participants. Four categories are used to describe the menstrual interval: less than 21 days, 21 to 35 days, more than 35 days, and irregular cycles. Among the participants, the most prevalent menstrual interval category was 21 to 35 days, with 27 participants (33.75%) reporting menstrual cycles falling within this range. This suggests that a significant portion of the participants had menstrual cycles of typical duration. Additionally, 25 participants (31.25%) reported menstrual intervals of more than 35 days, indicating a notable proportion experiencing longer menstrual cycles. Conversely, only 8 participants (10%) had menstrual intervals of less than 21 days, representing a smaller subset with shorter menstrual cycles. Furthermore, 20 participants (25%) reported irregular cycles, highlighting variability and unpredictability in menstrual patterns among the study population. Overall, the data illustrate the diverse range of menstrual cycle characteristics observed among the participants, with varying cycle lengths and irregularities being common occurrences. The table provides data on the duration of bleeding among a total of 80 patients. Four categories are used to categorize the duration of bleeding: less than 3 days, 3 to 6 days, more than 6 days, and more than 10 days. The majority of patients (56.25%) experienced bleeding lasting more than 6 days, indicating a prevalent occurrence of prolonged bleeding within this

group. Additionally, a significant proportion of patients (18.75%) reported bleeding duration between 3 to 6 days. Only a minority of patients experienced bleeding lasting less than 3 days (8.75%), while a smaller subset (16.25%) reported bleeding lasting more than 10 days. Overall, the data suggest that prolonged bleeding episodes (>6 days) are common among the patient population studied, highlighting the importance of investigating factors that may contribute to extended menstrual bleeding and addressing potential underlying causes to improve menstrual health outcomes.

Table 1: Menstrual cycle characteristics of participants

Menstrual cycle characteristics	**No of patients (n=80)**	**Percentage (%)**
Menstrual interval		
<21 days	8	10
21-35 days	27	33.75
>35 days	25	31.25
Irregular	20	25
Total	80	100
Duration of bleeding		
Number of days	**No of patients (n=80)**	**Percentage (%)**
<3	7	8.75
3-6	15	18.75
>6	45	56.25
>10	13	16.25
Total	80	100.00

Table 2 shows the BMI distribution of 80 participants, revealing weight category prevalence. BMI is divided into three categories: underweight (<18.5), normal weight (18.5-24.99), and overweight/obese (≥25). The bulk of participants (75.00%) are normal weight. About 15.00% are underweight, suggesting a subpopulation with potentially low body weight. In contrast, 10.00% of participants are overweight or obese. A variety of BMI classifications are represented in the population. Assessing nutritional status and health hazards related to weight fluctuations requires BMI knowledge. This data can help healthcare providers, academics, and policymakers develop cohort-specific interventions and health promotion programmes. The table summarises the 80 participants' BMI distribution and helps explain their weight status.

Table 2: Body Mass Index (BMI) distribution among 80 participants

BMI (Kg/m^2)	**No of participants(n=80)**	**Percentage (%)**
<18.5	12	15.00%
18.5 – 24.99	60	75.00%
≥25	8	10.00%
Total	80	100.00%

Table 3 presents data on the association between Body Mass Index (BMI) and the duration of bleeding during menstruation. Three BMI categories are analyzed: BMI ≤ 18.5, BMI 18.5 - 24.99, and BMI ≥ 25. Within each BMI category, the number and percentage of participants with bleeding duration ≤ 6 days and > 6 days are provided. Among individuals with a BMI ≤ 18.5, a significantly higher proportion experienced bleeding lasting > 6 days compared to those with bleeding lasting ≤ 6 days (75% vs. 25%, p = 0.0488). Conversely, within the BMI 18.5 - 24.99 category, the majority of participants (91.6%) had bleeding lasting ≤ 6 days, with only a small proportion experiencing longer bleeding durations (8.3%). In the BMI ≥ 25 category, all participants (100%) had bleeding lasting > 6 days, indicating a clear association between higher BMI and prolonged bleeding duration.

Overall, the data suggest a significant association between BMI and the duration of menstrual bleeding, with higher BMI categories being linked to an increased likelihood of experiencing bleeding lasting more than 6 days. These findings underscore the potential impact of BMI on menstrual health and may have implications for understanding and managing menstrual irregularities in individuals with higher BMI values.

Table 3: Association between Body Mass Index (BMI) and duration of bleeding

BMI (Kg/m^2)	≤ 6 days(n=22)	> 6 days(n=58)	P-value*
<18.5 (n=12); n(%)	9 (75%)	3 (25%)	0.0488
18.5 – 24.99 (n=60); n(%)	5 (8.3%)	55 (91.6%)	
≥25 (n=8); n(%)	0	8 (100%)	
Total (n=80); n(%)	14 (17.5%)	66 (82.5%)	

*compared between each BMI range

Table 4 presents data on the association between Body Mass Index (BMI) and the duration of menstrual cycles among 80 participants. The BMI categories analyzed include BMI <18.5, BMI 18.5 – 24.99, and BMI ≥25. The table is divided into four menstrual cycle categories: less than 21 days, 21 to 35 days, more than 35 days, and irregular cycles. Among participants with menstrual cycles lasting less than 21 days, all 8 participants were in the BMI <18.5 category, indicating a significant association between lower BMI and shorter menstrual cycles (p = 0.0423). Conversely, among participants with menstrual cycles lasting 21 to 35 days, all 27 participants were in the BMI 18.5 – 24.99 category, with no participants in the other BMI categories. This suggests that this BMI range is associated with typical menstrual cycle lengths. Additionally, all 25 participants with menstrual cycles lasting more than 35 days were in the BMI 18.5 – 24.99 category, indicating a potential association between this BMI range and longer menstrual cycles.

Furthermore, among participants with irregular menstrual cycles, there were 4, 8, and 8 participants in the BMI <18.5, BMI 18.5 – 24.99, and BMI ≥25 categories, respectively. The comparison between the "Irregular" and "21-35 days" menstrual cycle categories showed a significant difference in BMI distribution (p = 0.0415). This suggests that BMI may influence menstrual cycle irregularities. Overall, the data suggest that BMI may play a role in determining the duration and regularity of menstrual cycles, with lower BMI associated with shorter cycles and irregularities, and BMI 18.5 – 24.99 associated with typical cycle lengths. However, further research is needed to better understand the underlying mechanisms and implications of these associations.

Table 4: Association between Body Mass Index (BMI) and duration of menstrual cycle

		BMI				
Menstrual Cycle	**Number of Patients**	**<18.5**	**18.5 – 24.99**	**≥25**	**P1**	**P2**
<21 days	8	8	0	0	0.0423	0.0415
21-35 days	27	0	27	0		
>35 days	25	0	25	0		
Irregular	20	4	8	8		
Total	80	12	60	8		

P1: compared the significant difference between "Irregular" and "21-35 days"; P2: Compared the difference of percentage with that of increasing BMI

Discussion

The objective of a study conducted in the past was to evaluate the relationship between primary dysmenorrhea in females and body mass index (BMI). The dysmenorrhea score on the visual analogue scale (VAS) was significantly greater in the teen group who are underweight compared to the normal and overweight groups. Moreover, a strong negative association is seen between the Visual Analogue Scale (VAS) and body mass index (BMI) in the group of underweight teenagers. In addition, the group of teenagers who were obese showed a significantly higher score on the Visual Analogue Scale (VAS) for dysmenorrhea when compared to the groups of teenagers who were overweight, normal-weight, and underweight. Additionally, a little positive correlation was found between the scores obtained from the VAS and BMI in the group of overweight teenagers [6].

Research was conducted to determine the relationship between the incidence of dysmenorrhea and body mass index in teenagers. Additionally, the study aimed to assess the impact of socio-demographic factors, namely the disparity in dysmenorrhea incidence among urban and rural areas. A strong relation was seen between dysmenorrhea and BMI, with a higher incidence observed in individuals with decreased BMI. Therefore, enhancing the dietary requirements of adolescent girls could potentially alleviate dysmenorrhea [7].

Research investigating the relationship between the BMI (body mass index) category and the incidence of primary dysmenorrhea has yielded contradictory and controversial results. The aim of the research is to perform an evaluation of the available literature and investigate the relationship between various BMI categories and the occurrence of primary dysmenorrhea. Having a body weight below the optimal range may increase the probability of

developing primary dysmenorrhea, while being overweight or obese may not be linked to primary dysmenorrhea. Further investigation is necessary to explore the correlation between each body mass index (BMI) category and the incidence of primary dysmenorrhea because the existing meta-analysis had certain constraints. Following a balanced diet and adopting a proper lifestyle might be beneficial for individuals in attaining a healthy BMI and enhancing overall well-being, potentially decreasing the chances of developing primary dysmenorrhea [8].

Menstruation is a natural physiological process in females that signifies their potential to reproduce. Adolescent females frequently experience menstrual issues, which can have an impact on their daily lives and participation in outdoor activities. Females with atypical body mass index experience a higher frequency of suffering [9].

An investigation was carried out to evaluate the correlation between menstruation cycles and body mass index (BMI) issues among adolescent female students in Delhi. Menstrual issues, particularly dysmenorrhea, are common among adolescent females. The Body Mass Index (BMI) significantly influences the regularity of the menstrual cycle. Therefore, it is essential to provide adolescent girls with nutritious and well-balanced food, since this helps them maintain a healthy body mass index (BMI) and manage their menstrual cycle [10].

An etiological connection between dysmenorrheal characteristics and obesity is possible. The objective of the research was to determine the correlation between body mass index (BMI) and dysmenorrhea in a sample of women. In general, women with high-normal BMIs may experience severe dysmenorrhea. Additional investigation is required to validate the results [11].

An investigation was done in the past to assess the impact of body mass index and nutritional status on teenage girls' menstrual patterns. The study's findings indicate that most girls exhibited clear and diagnosable nutritional deficiency illnesses. Among the four hundred and one girls examined, two hundred thirty-one were diagnosed with anaemia. Most of the females (84.2%) had a regular menstrual cycle, and a healthy body mass index (BMI), and experienced their first menstruation before the age of 16. Girls who are overweight have irregular menstrual cycles [12].

Dysmenorrhea is a prevalent gynaecological disorder characterised by unpleasant uterine cramps during menstruation. The incidence of primary dysmenorrhea in central India has not been thoroughly investigated. The study aimed to ascertain the frequency of primary dysmenorrhea in adolescent females and evaluate the clinical indicators linked to dysmenorrhea. College-aged women have a notably high incidence of dysmenorrhea. Family history, duration of bleeding, and presence of clots were notable risk factors for dysmenorrhea [13].

Conclusion

In conclusion, our study provides evidence of a significant association between Body Mass Index (BMI) and the duration of menstrual bleeding and menstrual cycle length. Among individuals with BMI $\leq$ 18.5, there was a higher proportion experiencing bleeding lasting more than 6 days compared to those with lower BMI values, while in the BMI 18.5 - 24.99 category, the majority experienced bleeding lasting $\leq$ 6 days. Conversely, all participants with BMI $\geq$ 25 had bleeding lasting more than 6 days, indicating a clear association between higher BMI and prolonged bleeding duration. Similarly, lower BMI was associated with shorter menstrual cycle lengths, as evidenced by all participants with cycles less than 21 days falling into the BMI <18.5 category. Conversely, the majority of participants with cycles between 21 to 35 days fell into the BMI 18.5 – 24.99 category, suggesting a typical cycle length association with this BMI range. Furthermore, BMI may influence menstrual irregularities, as indicated by a significant difference in BMI distribution between participants with irregular cycles and those with cycles lasting 21-35 days. These findings underscore the potential impact of BMI on menstrual health and emphasize the importance of considering BMI in understanding and managing menstrual irregularities. Further research is warranted to elucidate the underlying mechanisms and clinical implications of these associations. While this study sheds light on the association between BMI, menstrual properties, and dysmenorrhea, further research is needed to elucidate underlying mechanisms. Specifically, investigating the hormonal and inflammatory pathways linking BMI to dysmenorrhea could provide insights into preventive and therapeutic strategies. Future research could explore the impact of lifestyle factors, such as diet and exercise, on dysmenorrhea in relation to BMI. Additionally, longitudinal studies tracking changes in BMI and menstrual symptoms over time could provide valuable data on the causal relationship between BMI and dysmenorrhea, guiding more targeted interventions.

References

1. Akerlund M, Stromberg P, Forsling MD. Primary dysmenorrhea and vasopressin. Br J Obstet Gynaecol. 1979; 86:484.
2. Melin P, Akerlund M, Vilhardt H. Antagonism of the myometrial response to oxytocin and vasopressin synthetic analgesics. Dan Med Bull.1979;26:126.

3. Demers LM, Hahn DW, McGuire JL. Newer concepts in dysmenorrhea research: leukotrienes and calcium channel blockers. In: Dawood MY, McGuire JL, Demers LM, editors. Premenstrual syndrome and dysmenorrhea. Baltimore: Urban &Schwarzenberg; 1985; 205.
4. Coco AS. Primary dysmenorrhea. Am Fam Physician. 1999; 60:489–496.
5. Andersch B, Milsom I. An epidemiological study of young women with dysmenorrhea. Am J Obstet Gynecol. 1982; 144:655–660.
6. Singh A, Kiran D, Singh H, et al. Study of prevalence and severity of dysmenorrhea. Indian J PhysiolPharmacol. 2008; 52:389–397.
7. Donayeva A, Amanzholkyzy A, Nurgaliyeva R, Gubasheva G, Abdelazim IA, Samaha II. The relation between primary dysmenorrhea in adolescents and body mass index. PrzMenopauzalny. 2023 Sep;22(3):126-129.
8. Chauhan M, Kala J. Relation between dysmenorrhea and body mass index in adolescents with rural versus urban variation. J Obstet Gynaecol India. 2012 Aug;62(4):442-5.
9. Wu L, Zhang J, Tang J, Fang H. The relation between body mass index and primary dysmenorrhea: A systematic review and meta-analysis. Acta Obstet Gynecol Scand. 2022 Dec;101(12):1364-1373.
10. Singh M, Rajoura OP, Honnakamble RA. Menstrual patterns and problems in association with body mass index among adolescent schoolgirls. J Family Med Prim Care. 2019 Sep 30;8(9):2855-2858.
11. Takata K, Kotani K, Umino H. The Relationship Between Body Mass Index and Dysmenorrhea in the General Female Population. J Clin Med Res. 2023 Apr;15(4):239-242.
12. Dars S, Sayed K, Yousufzai Z. Relationship of menstrual irregularities to BMI and nutritional status in adolescent girls. Pak J Med Sci. 2014 Jan;30(1):141-4.
13. Kural M, Noor NN, Pandit D, Joshi T, Patil A. Menstrual characteristics and prevalence of dysmenorrhea in college going girls. J Family Med Prim Care. 2015 Jul-Sep;4(3):426-31.