Original Research Article

ASSOCIATION OF PRIMARY DYSMENORRHEA WITH BODY MASS INDEX

Saambhavi[1], Suman Nishad[2], Shweta Kumari[2], Fareha Khatoon[3], Ayesha Ahmad[4], Uma Gupta[5]

[1]Senior Resident, Department of Obstetrics and Gynaecology, Guru Tegh Bahadur Hospital, University College of Medical Sciences, New Delhi
[2]Assistant Professor, Department of Obstetrics and Gynaecology, Era's Lucknow Medical College and Hospital, Lucknow, India.
[3]Consultant, Department of Obstetrics and Gynaecology, Apollomedics, Lucknow, India.
[4]Professor, Department of Obstetrics and Gynaecology, Era's Lucknow Medical College and Hospital, Lucknow, India.
[5]Professor and Head, Department of Obstetrics and Gynaecology, Era's Lucknow Medical College and Hospital, Lucknow, India.

Abstract

Background: This study aimed to investigate the influence of BMI on primary dysmenorrhea. As a secondary outcome measure, we studied the effect of BMI and waist- hip ratio on other aspects of menstrual cycles. **Materials and Methods:** The present study is an observational cross-sectional study conducted at Era's Lucknow Medical College and Hospital over a period of 24 months. Subjects were recruited after informed consent, excluding cases of secondary dysmenorrhea or those on hormonal medication. A pre-designed data sheet was used to record history and relevant findings which were then subjected to appropriate statistical tests. **Results:** 284 subjects were analysed. Mean body mass index [BMI; kg/m2] was 22.61 ± 3.76 with 22.5% overweight and 3.2% obese. There was no association of BMI with dysmenorrhea [p=0.323]. BMI was significantly associated with menstrual irregularity [p=0.009]. The mean hip-waist ratio was 0.85 ± 0.08 with no significant association with dysmenorrhea [p=0.073] or menstrual irregularity [p=0.999].**Conclusion:** The prevalence of primary dysmenorrhea was 85.21%. Mild dysmenorrhoea was most common (47.18%) followed by moderate (29.23%) and severe dysmenorrhea (8.80%). There was no significant association between dysmenorrhea and BMI or waist-hip ratio. Increase in BMI was significantly associated with menstrual irregularity.

INTRODUCTION

Primary dysmenorrhea is one of the most common gynaecological conditions in women of reproductive age group and is a major contributor to female morbidity and economic burden of society due it its global impact on the quality of life, including effects on occupational and social life, decrease in individual productivity, escalation of medical care costs.[1,2,3]

The prevalence of dysmenorrhea has been found to range from 16-91% in women of reproductive age group.[4] It is generally agreed that the exact prevalence and severity is difficult to estimate due to controversy over definitions and interplay of demographic, reproductive, lifestyle, physiological, psychological and socio-cultural factors.[5]

Some initial studies suggested that body mass index [BMI] may be proportional to the severity as well as duration of pain.[6] This attains relevance in the scenario of obesity attaining the dubious status of 'global epidemic' by the World Health Organisation [WHO].7,8 Even in developing countries like India, obesity is an alarming concern in women of childbearing age group.9 As per "National Family Health Survey-4 (NFHS, 2015-16)", 20.7% of women fall into the category of overweight/obese (BMI-≥25kg/m2).[10,11] Women in urban areas and having a higher socioeconomic status (SES) are more prone to obesity.[12,13]

Due to conflicting evidence, the relationship of primary dysmenorrhea with BMI remains controversial.[5] The present study was planned to investigate the influence of BMI on dysmenorrhea in the setting of lower socio-economic status of an urban Indian population. As a secondary outcome measure, we also aimed to study effect on regularity of menstrual cycles, and any association of waist-hip ratio [W/H ratio] with the same parameters.

MATERIALS AND METHODS

The study was conducted as an observational cross-sectional study at Era's Lucknow Medical College and Hospital, over a period of 24 months. Prior clearance was obtained from the institutional ethics committee. Subjects were recruited after informed consent, excluding cases of endometriosis, pelvic inflammatory disease, fibroid uterus, psychiatric problems or those on hormonal medication. History and findings of relevant clinical examination were noted on a pre- designed data sheet.

Ethics

The study was approved by Ethical Review Committee of Era University, Lucknow, India.

Statistics

Sample size was calculated on the basis of proportion of severe dysmenorrhea in underweight (lowest BMI category) to overweight category using the formula: e= 0.75 (p1-p2). [p1= 0.76, proportion of severe dysmenorrhea in underweight category; p2= 0.06, proportion of severe dysmenorrhea in overweight category]. Keeping data loss factor as 10%, Type I error, α=5%; Type II error β=10% and power of study 90%, the minimum sample size was calculated to be 208.

Data normality was checked by Kolmogorov-Smirnov test. Categorical variables were categorised as number and percentage (%) and quantitative data presented as mean ± SD and median with 25th and 75th percentiles (interquartile range). Quantitative variables were analysed using ANOVA and independent t test [normally distributed data] and Kruskal Wallis test [skewed data]. Qualitative variables were analyzed using Fisher's exact test. Statistical Package for Social Sciences (SPSS), IBM manufacturer, Chicago, USA, ver 21.0 was used for final analysis. A p value of less than 0.05 was considered statistically significant.

RESULTS

284 subjects in the age group of 18-30 years were recruited for the study. The mean age of subjects was 22 years. Table 1 summarises descriptive factors of the study subjects. Severity of dysmenorrhea was graded according to the Multi-Dimensional Scoring System of Dysmenorrhea which accommodates ability to do routine activities, need for medications and absenteeism. Primary dysmenorrhea was reported in 85% of subjects. Majority of cases had mild dysmenorrhea (47.18%). Table 2 summarises association between BMI and menstrual parameters taken in the present study. Distribution of dysmenorrhea was found to be comparable in the study groups [p value >0.05]. Menstrual irregularity was increased with increase in BMI. [p value <0.05] [Figure 1]

Table 3 shows correlation of menstrual parameters with waist to hip ratio. The mean [+ SD] waist to hip ratio was similar in study subjects [p value 0.999]. There was no relation of menstrual irregularity with W/H ratio.

Table 1: Descriptive characteristics of subjects

	Observation	Frequency[%]
Age [years]		
	18-20	98 (34.51%)
	21-25	145 (51.06%)
	26-30	41 (14.44%)
	Mean age + SD	22.27 + 2.9 (20-24.25)
BodyMass Index [Kg/m^2]		
	<18.5	32 (11.27%)
	18.6-24.9	179 (63.03%)
	25 - 29.9	64 (22.54%)
	30 - 34.9	9 (3.17%)
	Mean BMI+/- SD	22.61+/- 3.76(19.93 – 25.06)
Waist to Hip ratio [Mean ± SD]		
	Waist circumference (cm)	30.75 +2.933 (28-32)
	Hip circumference (cm)	36.04 +3.76 (34-38)
	Waist to hip ratio	0.85 + 0.08 (0.80 – 0.88)
Menstrual Features		
	Menarche [years]	12.79 + 1.6 (12-14) [Mean + SD]
	Cycle length [days]	
	• <24	• 5 (1.76%)
	• 24-28	• 263 (92.61%)
	• >38	• 16 (5.63%)
	Cycle regularity	
	• Irregular	• 62 (21.83%)
	• Regular	• 222 (78.17%)
	Duration of menses (days)	
	• <2	• 2 (0.70%)
	• 2-8	• 263 (92.6%)
	• >8	• 19 (6.6%)

	Dysmenorrhea	
	• None	• 42 (14.79)
	• Mild	• 134 (47.18)
	• Moderate	• 83 (29.23)
	• Severe	• 25 (8.8)
	Analgesic required	• 101 (35.56%)
	• Yes	• 183 (64.44%)
	• No	

Table 2: Association of Menstrual characteristics with BMI (Kg/m^2)

Parameter	BMI <18.5 (n=32)	BMI 18.5-24.9 (n=179)	BMI 25-29.9 (n=64)	BMI ≥30 (n=9)	Total	P value
Dysmenorrhea						
No dysmenorrhea	5 (15.63%)	25 (13.97%)	12 (18.75%)	0(0%)	42 (14.79%)	
Mild	15 (46.88%)	80 (44.69%)	36 (56.25%)	3 (33.33%)	134 (47.18%)	0.323*
Moderate	9 (28.13%)	58 (32.40%)	12 (18.75%)	4 (44.44%)	83 (29.23%)	
Severe	3 (9.38%)	16 (8.94%)	4 (6.25%)	2 (22.22%)	25 (8.8%)	
Regularity of menses						
Irregular	6(18.75%)	30(16.76%)	22(34.38%)	4(44.44%)	62(21.83%)	0.009*
Regular	26(81.25%)	149(65.63%)	42(65.63%)	5(55.56%)	222(78.17%)	
Duration of menses						
<2 days	0(0%)	2(1.12%)	0(0%)	0(0%)	2(0.70%)	
2-8 days	29(90.63%)	163(91.06%)	63(98.44%)	8(88.89%)	263(92.61%)	0.348*
>8 days	3(9.38%)	14(7.82%)	1(1.56%)	1(11.11%)	19(6.69%)	
Frequency of menses						
<24 days	0(0%)	5(100%)	0(0%)	0(%)	5(1.76%)	
24-38 days	31(11.79%)	166(63.12%)	59(22.43%)	7(2.66%)	263(92.6%)	0.233*
>38 days	1(6.25%)	8(50%)	5(31.25%)	2(12.50%)	16(5.63%)	
*Fisher exact test						

Table 3: Association of menstrual characteristics with waist to hip ratio

| Parameter	Waist to hip ratio			P value
	Mean ± SD	Median. (25th-75th centile)	Range	
Dysmenorrhea				
No dysmenorrhea	0.89 ± 0.08	0.88(0.833-0.933)	0.77-1.08	
Mild	0.84 ± 0.07	0.84(0.792-0.887)	0.68-1.02	0.073+
Moderate	0.84 ± 0.07	0.82(0.792-0.882)	0.7-1.15	
Severe	0.85 ± 0.09	0.86(0.8-0.89)	0.7-1.07	
Regularity of menses				
Irregular	0.85 ± 0.07	0.85(0.789-0.893)	0.75-1.08	0.999++
Regular	0.85 ± 0.08	0.84(0.8-0.889)	0.68-1.15	
Frequency of menses				
<24 days	0.84 ± 0.07	0.84 (0.813-0.859)	0.79 – 0.88	
24-38 days	0.85 ± 0.08	0.84 (0.8-0.889)	0.68 – 1.15	0.084*
>38 days	0.79 ± 0.03	0.78 (0.773-0.816)	0.76 – 0.86	
+ANOVA, ++Independent t test, * Fisher exact test				
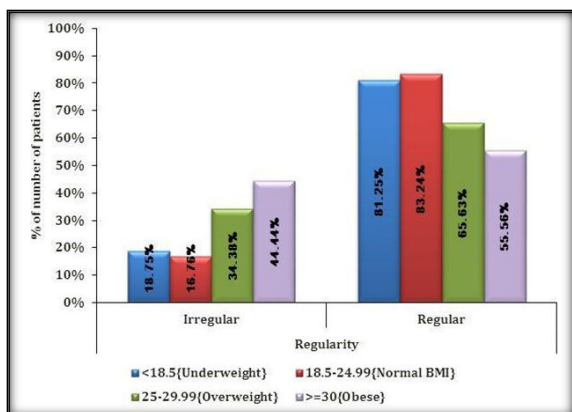
Figure 1: Showing association of BMI with menstrual regularity

DISCUSSION

Dysmenorrhea remains an important cause of morbidity in females of reproductive age group. We found the prevalence of primary dysmenorrhea as 85.12% in the present study. Similar observations have been reported by other investigators (Vermaet al.[14] [60.66%]; Mohapatra et al.[15] [74%]; Yesuf et al.[16][71.8%]; Tangchai et al17 [84.20%]). Despite diverse ethnicities, population and genetic diversity, prevalence of dysmenorrhea is noted to be high, thus making it a highly relevant clinical problem globally.

We noted severe dysmenorrhea in 8.8% of study subjects. Interestingly, despite severe dysmenorrhea being noted in only 8.8% of study population, its importance is underscored by the fact that it is affecting the subgroup of population that is young and results in significant loss of economically active days, workplace attendance, burdens with extra financial requirement and visits to healthcare professional every month and is a cause of mental ill health among women. Our findings are similar to observations by other investigators who have generally found severe dysmenorrhea in less than 10% of study population (Kaur 18 et al [6.67%]; Verma.[14] et al [10.81%]; Tangchai.[17]et al [4.7%]).

We did not find any association of dysmenorrhea with BMI (P=0.323). This is similar to observations noted by Verma et al (p value -0.605). There are, however, conflicting results on the subject. While Mohapatra.[15] 15 et al found significant association of mild and moderate dysmenorrhea with low BMI, Kaur et al found a positive association between increasing BMI and severity of dysmenorrhea. In the present study, majority of subjects had a normal BMI (63.03%) with only 3.17% being obese. This might have restricted the power of study to derive a significant statistical association of BMI.

Interestingly, Ju et al 3 found a U-shaped association between dysmenorrhea and BMI, suggesting increased prevalence with extremes of BMI. Higher prevalence of severe pain was found in both underweight as well as overweight participants.

We did find a significant increase in irregularity of menses(P=0.009) with increasing BMI; which has been consistently observed by other investigators. [Dars et al 19(P<0.001) and Singh et al(P-0.0002)]. There have been many observations that extremes of BMI can cause irregularity of menstrual cycles. Al Kashif et al20 found that irregular menstrual cycle was present more in underweight and overweight women as compared to those with a normal BMI (30.1 and 30.7% respectively).

Strengths
1. The present study is one of the few studies on dysmenorrhea in the urban Indian setting of a Medical College catering primarily to women belonging to lower socio-economic class.
2. The pre-calculated sample size was achieved within the mentioned time frame which ensured that our results were relevant and could be extrapolated to the population of the region in general.
3. We have measured various anthropometric indices such as weight, height, W/H ratio and statistical calculation has been done with both BMI as well as W/H ratio.

Limitations
Being a single center hospital-based study, its results are difficult to generalise and may be subject to bias by the type of patients, their socio-economic and literacy status and recall bias. Also, because pain is an objective measurement, variability in the data might be due to individual differences and sensitivity.

CONCLUSION

he prevalence of primary dysmenorrhea in the age group of 18-30 years was 85.21%.
- Mild dysmenorrhoea was most common (47.18%) followed by moderate (29.23%) and severe dysmenorrhea (8.80%).
- There was no significant association between dysmenorrhea and BMI or W/H ratio.
- Menstrual irregularity was significantly associated with increase in BMI.

Conflict of interest: The authors declare no conflict of interest.
Funding: nil.

REFERENCES

1. Barnard K, Frayne SM, Skinner KM, Sullivan LM. Health status among women with menstrual symptoms. J Women Health 2003;12(9):911–9.
2. Bettendorf B, Shay S, Tu F. Dysmenorrhea: contemporary perspectives. ObstetrGynecol Survey 2008;63(9):597–603.
3. Ju H, Jones M, Mishra GD. A U-shaped relationship between body mass index and dysmenorrhea: a longitudinal study. PLoS One 2015;10(7):e0134187.
4. Ju H, Jones M, Mishra G. The prevalence and risk factors of dysmenorrhea. Epidemiol Rev 2014;36(1):104–13.
5. El-Kosery SM, Mostafa NT, Yosseuf HH. Effect of body mass index on primary dysmenorrhea and daily activities in adolescents. Med J Cairo Univ 2020;88(1):79-84.

6. Harlow SD, Park M. A longitudinal study of risk factors for the occurrence, duration and severity of menstrual cramps in a cohort of college women. Br J ObstetGynaecol 1996;103(11):1134–42.

7. World Health Organization. Obesity: preventing and managing the global epidemic. Report of a WHO consultation. World Health Organ Tech Rep Ser2000;894:1–253..

8. World Health Organization. Body mass index. Available from https://www.euro.who.int/en/health-topics/disease-prevention/nutrition/a-healthy-lifestyle/body-mass-index-bmi [Accessed June 2021].

9. Pandey S, Bhaskaran A, Agashe S, Vaidya R. A cross-sectional study of childhood and adolescent obesity in affluent school children from western suburbs of Mumbai 2001-2002 and 2013-2014. J ObesMetab Res 2014;1:7-13.

10. International Institute for Population Sciences (IIPS), National Family Health Survey (NFHS-4), IIPS, Mumbai, India, 2015-2016.

11. International Institute for Population Sciences (IIPS) and Macro International, National Family Health Survey (NFHS-3), 2005. 06: India: Volume I, IIPS, Mumbai, 2007.

12. Wang Y, Chen HJ, Shaikh S, Mathur P. Is obesity becoming a public health problem in India? Examine the shift from under- to overnutrition problems over time. Obes Rev 2009;10:456-74.

13. Mendez MA, Monteiro CA, Popkin BM. Overweight exceeds underweight among women in most developing countries. Am J ClinNutr2005;81:714-21.

14. Verma I, Joshi G, Sood D, Soni RK. Menstrual problems in undergraduate medical students: a cross-sectional study in a medical college of North India. J South Asian FederObstGynae 2020;12(2):85–90.

15. Mohapatra D, Mishra T, Behera M, Panda P. A study of relation between body mass index and dysmenorrhea and its impact on daily activities of medical students. Asian J PharmClin Res 2016;9(3):297-9.

16. Yesuf TA, Eshete NA, Sisay EA. Dysmenorrhea among University Health Science Students, Northern Ethiopia: impact and associated factors. Int J Reprod Med 2018;2018:9730328.

17. Tang Y, Chen Y, Feng H, Zhu C, Tong M, Chen O. Is body mass index associated with irregular menstruation: a questionnaire study? BMC Women's Health 2020;20:226.

18. Kaur G, Kaur P, Himani. A study of the relation of BMI with dysmenorrhea in adolescent girls. Int J Curr Res Med Sci 2017;3(8):65-70.

19. Dars S, Sayed K, Yousufzai Z. Relationship of menstrual irregularities to BMI and nutritional status in adolescent girls. Pak J Med Sci 2014;30(1):140-4.

20. Al-Kashif MM. Interrelation between menstrual problems and body mass index among undergraduate female students: cross sectional study. Asian J Sci Res 2020;13:164-9.