



Menstrual pattern and Body Mass Index in adolescent school girls; a cross-sectional study.

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ABSTRACT

Introduction: Menstrual Irregularities are common in adolescent girls which may affect their life style, school attendance and outdoor activities. Adolescent with abnormal Body Mass Index (BMI) suffer even more frequently.

Objectives: The objective of the study was to assess the relationship between Body Mass Index and menstrual irregularities among the adolescent school girls of Bhubaneswar, Odisha.

Methods and Materials: The present study was a descriptive cross-sectional study conducted among 600 adolescent girl of three senior secondary school of Bhubaneswar, Odisha. Data obtained in MS excel were analyzed. Statistical significance was calculated using Chi-square test and p value.

Results: The BMI distribution of the adolescent girls in the present study were normal weight 65.50%, under weight 20% and overweight in 13.50%. The mean age of menarche was 13 ± 2.1 SD. Dysmenorrhea (56.33%), hypomenorrhoea (45.33%) and irregular menstrual cycle (28.83%) were common menstrual problem observed in our study. Abnormal BMI was observed to be significantly associated with irregular menstrual cycle, oligomenorrhoea, polymenorrhoea, hypomenorrhoea and menorrhagia. But no significant association has been observed between the BMI and dysmenorrhea or its severity.

Conclusion: Abnormal BMI was observed in more than one third of the adolescents. Menstrual problems are more prevalent with abnormal BMI.

KEYWORDS : Body Mass Index, Menstrual Irregularities, Adolescents.

INTRODUCTION

The menstrual abnormalities are the most challenging problem encountered during adolescence.¹

These are the major source of anxiety not only to adolescent girls but also to their families.²

Currently BMI of adolescent age group is in increasing trend around the world. As per WHO, the BMI of 12 to 17 years old girls has increased from 5.7% on 2009 to 11.1% on 2011 which may adversely affect female reproductive health.² It has been observed that both under weight and overweight girls have increased risk of menstrual problem.³

BMI is a simple index of weight-for-height. It is defined as the weight in kilograms divided by the square of the height in metres⁴. With increasing body mass index(BMI) there was a significant increase in the prevalence of oligomenorrhoea whereas polymenorrhoea was more prevalent in the girls with low BMI.⁵ Obesity in childhood and adolescents leads to increase risk of menstrual problems.³ The adolescent girl is a very shy person and often feel reluctant to seek help regarding her problems.⁶

The purpose of the present study is to assess the Body Mass Index and determine the prevalence of menstrual irregularities among the adolescents and to observe if there is any relationship between the two.

AIMS AND OBJECTIVES

The objectives of the study are:

1. To determine the occurrence of menstrual problems among adolescent girls.
2. To find out the relationship between menstrual problems and BMI among adolescent girls.

MATERIALS AND METHODS:

This descriptive cross-sectional study was conducted among 600

adolescent girl of three senior secondary school in Bhubaneswar Odisha in 2015. They were asked to fill up a predesigned structured questionnaire which included demographic details, menstrual pattern and assessment of Body Mass Index were done.

Permission from the School principal was obtained beforehand and the adolescent girls were thoroughly explained about the study before they were asked to fill up the questionnaire.

All the students were subjected to anthropometric measurements that were weight and height by using the weighing machine and measuring tape.

Data collected in MS Excel were analyzed to identify the occurrence of menstrual problems. Its relation with BMI and statistical significance of the association were calculated using chi-square test and p value.

RESULTS

The age of the respondents were from 11.4 to 18.7 years. According to distribution of BMI number of respondents with normal BMI (65.50%) were more than underweight (20%) and overweight/obese respondents(13.50%, 1%).

Figure- 1- Distribution according to BMI

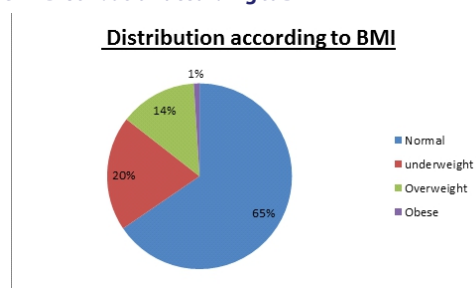


TABLE-1 Age of menarche and BMI

Age of menarche	Body Mass Index		
	Normal	Underweight	Overweight & obese
	No. (n=393)	No. (n=120)	No. (n=87)
10	33 (8.39%)	0 (0%)	17 (19.54%)
11	149 (37.91%)	21 (17.50%)	58 (66.66%)
12	194 (49.36%)	78 (65%)	10 (11.49%)
13	13 (3.30%)	17 (14.16%)	2 (2.29%)
14	2 (0.50%)	2 (1.66%)	0 (0%)
15	1 (0.25%)	2 (0.83%)	0 (0%)
16	1 (0.25%)	0 (0.83%)	0 (0%)

($\chi^2 = 117, p \text{ value} < 0.001^*$)

The minimum age of menarche in our study is 10 years and maximum age was 16 years with the mean age is 13 years +2.16 SD.

TABLE 2-Rhythm of menstrual cycle and BMI

Rhythm	Body mass Index		
	Normal	underweight	Overweight & obese
	(n=393)	(n=120)	(n=87)
Regular (n-421)	313 (79.64%)	79 (65.83%)	29 (33.33%)
Irregular(n-179)	80 (20.35%)	41 (34.16%)	58 (66.66%)

(The chi-square statistic is 74.3242. The *p*-value is < 0.00001. The result is significant at *p* < .05).

TABLE-6-Association between common menstrual problems and BMI

Variables	BMI of Respondents			χ^2 , P value
	Normal (n-393)	Underweight (n-120)	Overweight & obese (n-87)	
Irregular cycle				
Yes (n-179)	80 (20.35%)	41 (34.16%)	58 (66.66%)	χ^2 -46.959 <i>p</i> < 0.001 ⁺
No (n-421)	313(79.64%)	79 (65.83%)	29 (33.33%)	
Shorter cycle (Polymenorrhoea)				
Yes(n-60)	35 (8.90%)	8 (6.66%)	17 (19.54%)	χ^2 -9.070 <i>p</i> - 0.01 ⁺
No(n-540)	358 (91.09)	112 (93.33%)	70 (80.45%)	
Oligomenorrhoea (infrequent cycle)				
Yes(n- 51)	17 (4.32%)	12 (10%)	22 (25.28%)	χ^2 -20.514 <i>p</i> < 0.001 ⁺
No (n- 549)	376 (95.67%)	108(90%)	65 (74.71%)	
Hypomenorrhoea (scanty bleeding)				
Yes (n-272)	167(42.49%)	65 (54.16%)	29 (33.33%)	χ^2 -8.879 <i>p</i> - 0.01 ⁺
No(n-328)	226 (57.50%)	55 (45.83%)	58 (66.66%)	
Menorrhagia				
Yes (36)	4(1.01%)	12(10%)	20(22.98%)	χ^2 -24.288 <i>p</i> < 0.001 ⁺
No (564)	389(98.98%)	108(90%)	67(77.01%)	
Dysmenorrhoea				
Yes (n-338)	208(52.92%)	82(68.33%)	48(55.17%)	χ^2 -5.152 <i>p</i> - 0.07
No (n- 262)	185(47.07%)	38(31.66%)	39(44.82%)	

DISCUSSION

Obesity in children and adolescents is gradually becoming a major public health problem in many developing countries, including India. The prevalence is higher in urban than in rural areas. The results of studies among adolescents from different part of the country revealed that the prevalence of overweight and obesity was high ranging from 11% to 29%. A similar study conducted in Chennai, in South India, showed the prevalence of overweight as 17% and of obesity as 3%.⁷

In our study number respondent with normal BMI (65.50%) were more than underweight(20%) and overweight/obese respondents(13.50% , 1%). This was similar to the study of Despande H and Binu Thapa.^{8,9}

BMI is used in this study to calculate the nutritional status. But body fat content is one of the factors that affects menstruation by causing hormonal alteration. Since BMI did not accurately measure body fat, hence in many study the relationship between the BMI and menstrual cycle is not so consistent.¹⁰

TABLE-3- Cycle length and BMI

Cycle length	Body mass Index		
	Normal (n-393)	Underweight (n-120)	Overweight & obese (n-87)
<21 (60)	35 (8.90%)	8 (6.66%)	17 (19.54%)
21-35 (489)	341 (86.76%)	100 (83.33%)	48 (55.17%)
>35 (51)	17 (4.32%)	12 (10%)	22 (25.28%)

(Chi-square statistic is 55,728, *p* value < 0.001)

TABLE-4- Duration of menstrual flow and BMI

Duration of flow	Body mass Index		
	Normal (n-393)	Underweight (n-120)	Overweight & obese (n-87)
<2 (n-14)	2 (0.50%)	5 (4.16%)	7 (8.04%)
3-7 (n-565)	386 (98.21%)	106 (88.33%)	71 (81.60%)
>7 (n- 21)	5 (1.27%)	7 (5.83%)	9 (10.34%)

TABLE-5-Amount of menstrual blood loss and BMI

Amount	Body mass Index		
	Normal (n-393)	Underweight (n-120)	Overweight & obese (n-87)
Scanty (n-272)	167(42.49%)	65(54.16%)	29(33.33%)
Average (n-292)	222(56.48%)	43(35.83%)	38(43.67%)
Heavy (n-36)	4 (1.01%)	12(10%)	20(22.98%)

Many studies have confirmed that a higher increase in body mass index (BMI) during childhood is related to an earlier onset of puberty. But median age at menarche remained relatively stable, between 12 and 13 years, across well-nourished populations in developed countries despite variations worldwide.^{11,12}

In our study, majority of girls with BMI normal and underweight attended menarche at 12 years whereas overweight and obese girls tend to have menarche at early age (11 years).

Girls with higher BMI attain menarche earlier than their normal weight counterparts, this has also been observed by Raji et al¹³ and Goon et al¹⁴ in Nigeria, Trentham-Dietz et al¹⁵, Bagga and Kulkarni¹⁶ in India and Ahmed LM¹⁷.

Majority of girls in our study with normal BMI and underweight had regular cycle (79.64%, 65.83%) whereas only 33.33% of overweight and obese had their cycles regularly indicating that BMI is an important factor affecting irregular menstrual cycles. This findings has also been noted by Fujiwara T¹⁸ and Seetal B.¹²

Majority of the girls in the present study have cycle length normal (21-35 days). Percentage of girls having shorter and longer menstrual intervals are higher in obese and overweight compared to other BMI. The association between high BMI and menstrual cycle length was found statistically significant (p value < 0.001).

The effect of BMI on menstrual cycle characteristics is well documented^{19,20}. Body fat and obesity influence the menstrual cycle leading to cycle irregularities²¹. Overweight and obese young females are at a greater risk of experiencing longer and infrequent periods²²⁻²³. High BMI and sedentary life style may influence hormonal factor such as insulin and sex hormone binding globulin (SHBG) resulting in irregular menstrual cycle.^{24,25}

Our findings were consistent with the above reports. The girls with higher BMI experienced significantly longer menstrual cycle and in addition longer duration of menstrual flow compared to their normal weight counterparts.

Most of the girls have normal duration of flow. Very few have scanty or prolonged bleeding which was noticed more frequently in overweight/obese than other BMI. Majority of the respondents of all BMI have average menstrual flow. Significantly higher percentage of underweight complained of scanty bleeding whereas higher percentage of overweight/obese girls reported heavy bleeding.

In the present study BMI is significantly associated with irregular menstrual cycle, polymenorrhea, oligomenorrhea and hypomenorrhea and menorrhagia while there is no statistically association between BMI and dysmenorrhea and its severity.

Similar to a Nizerian study²⁶ and an Indian study²⁷ our observation on the severity of the menstrual pain and BMI were inconsistent and unreliable.

CONCLUSION:

More than one third of the adolescents had abnormal BMI. Common menstrual problems such as irregular cycle, hypomenorrhoea, oligomenorrhoea, menorrhagia are more prevalent with abnormal BMI both in overweight and underweight. Current study concluded that, there is a positive correlation between body mass index and menstrual profile.

Life style modifications like regular physical activity, decreasing the intake of junk food, promoting healthy eating habits and maintaining optimal BMI should improve menstrual health.

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