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BODY MASS INDEX AND ITS RELATION WITH MENSTRUAL DISORDERS IN ADOLESCENT GIRLS

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Abstract

Back ground: Menstruation is one of the most important physiological changes during adolescent years. Regular rhythmic menstrual periods are physiological phenomenon for any woman from menarche to menopause. Adolescent girls do suffer frequently from menstrual disorders as they are closely compelling with the process involved in the pubertal development. Regular menstrual cycle reflects women's endocrine function and reproductive health. Many factors influence the regularity and flow of a girl's menstrual cycles which include hormonal changes, BMI, serious medical disorders, and genetics. The purpose of this study is to determine the relation between BMI and menstrual characteristics in adolescent.

Materials and methodology: This study is undertaken in a tertiary care hospital, Kurnool, in the department of obstetrics and gynecology for a period of 1year after obtaining clearance from the institutional ethical committee. This is a prospective observational study and the study participants were the girls attending the gynecology OPD.

Results: 49.5% of the girls had menstrual irregularities of which6 (3%) had frequent cycles <24 days, and 93 (46.5%) had infrequent cycles (cycle length >38 days). 42 (21%) of the girls had heavy menstrual bleeding with duration of flow >9days. 43(21.5%) had premenstrual symptoms. Statistically significant association was found between menstrual irregularities, thyroid disorders, hyperandrogenism and BMI.

Key words: BMI, menstrual irregularities, adolescents, hyperandrogenism, thyroid disorders.

INTRODUCTION

Menstruation is one of the most important physiological changes during adolescent years. Regular rhythmic menstrual periods are physiological phenomenon for any woman from menarche to menopause.[1]

Adolescent girls do suffer frequently from menstrual disorders as they are closely compelling with the process involved in the pubertal development. Regular menstrual cycle reflects women's endocrine function and reproductive health. Many factors influence the regularity and flow of a girl's menstrual cycles which include hormonal changes, BMI, serious medical disorders, and genetics.[2]

The word adolescence is derived from Latin word adolescere means to mature. Adolescent is the age group between 10 to 19 years. It is the transition phase from childhood to adult sexual maturation[1]. It is the process in which physical, psychological and biological changes take place to attain sexual reproduction.[3]

India has largest adolescent population in the world i.e., 253 million and every 5th person is adolescent. Age of menarche is generally between 11 to 15 years. Slight variation is seen depending upon hereditary pattern, nutrition, race, psychological state.[4]

Initially the cycles are irregular due to immaturity of the HPO axis and most of the cycles are anovulatory without any dysmenorrhea. It takes 2yrs for regularization of cycles.

Factors play important role in regularity of cycles includes hormonal changes, genetics, serious medical conditions, body mass index.[5]

On set of menstruation is hall mark of female puberty. Development of menstrual problems is common in adolescent girl, but menstrual disorders in women are over-looked and are significant source of morbidity in this population. This may lead to physical, mental, social, psychological and reproductive problems.[6]

Menstruation is characterized by variability in frequency, regularity, and volume. A survey reported about 64% girls having at least one problem related to menstruation.[2] The prevalence of menstrual disorders in India has been recorded as high as 87%.[7]

The purpose of this study is to determine the relation between BMI and menstrual characteristics in adolescent.

MATERIALS AND METHODS

This study is undertaken in a tertiary care hospital, Kurnool, in the department of obstetrics and gynaecology for a period of 1year after obtaining clearance from the institutional ethical committee.

This is a prospective observational study. The data was collected from the adolescent girls attending to gynecology OPD after taking informed consent. Information regarding demographic-history, menstrual history, regarding duration of cycle, flow (normal, moderate or heavy), cycle interval, presence or absence of dysmenorrhea, and premenstrual symptoms (headache, giddiness, mood swings, leg cramps, abdominal cramps, breast tenderness, any other symptoms), dietary habits were considered. Clinical examination was conducted at the same time. Examination included looking for signs of anemia, lymphadenopathy, thyroid gland enlargement, Anthropometric measurements including height, weight, BMI calculated. Laboratory investigations including Hb, thyroid function test, sonography is considered.

Inclusion Criteria

1. 12-19 years adolescent girls with menstrual cycle disorders.
2. Unmarried

Exclusion Criteria

1. Married girls
2. Chronic diseases
3. Medications including OCPs
4. Primary amenorrhea
5. Failure to followup/ dropouts
6. Pregnancy

Investigations required

1. Complete blood picture
2. Blood grouping and typing
3. Blood sugars
4. Thyroid profile
5. Ultrasound abdomen and pelvis

RESULTS

Total two hundred girls participated in the study. The study participants were classified according to BMI. The girls with BMI 25 and above were classified as overweight and with BMI >18.5 were classified as under-weight.

Table-1 describes the prevalence of over-weight and under-weight girls.

In the study group 17.5% of the girls were under-weight and 9% of the girls were over-weight.

18.5% of the girls takes junk food and prevalence of obesity was more common in obese girls. Dietary habits and obesity are significantly related.

The mean age of menarche in the study group was 12.3 yrs. 61.5% of the girl's attained menarche by the age of 12yrs.

Menstrual pattern: 101 (50.5%) of the girls had normal menstrual cycles of 3-8 days / 24-38days, 6 (3%) had frequent cycles <24 days, and 93 (46.5%) had infrequent cycles (cycle length >38 days). 42 (21%) of the girls had heavy menstrual bleeding with duration of flow >9days. 43(21.5%) had premenstrual symptoms.
Table 5 describes the relation between BMI and menstrual disorders. dysmenorrhea was common in normal weight girls followed by underweight girls.
In the present study 94.4% of over-weight girls and 57.1% of under-weight girls had infrequent cycles. 8.6% of under-weight girls had frequent cycles. Menstrual irregularities are common in under-weight and over-weight girls. X2=29.03, p=0.001.
The association between BMI and menstrual irregularity was found to be statistically significant.
Thyroid dysfunction was seen in 37.1% of under-weight girls, 13.6% of the normal weight girls and 5.6% of the over-weight girls. X2=17.2, p=0.005.
The association between BMI and thyroid dysfunction is statistically significant.

Table 6 shows the relation between BMI and anaemia. 60% of the study participants had mild anaemia, 30.5% had moderate anaemia and 6% had severe anaemia. 14.3% of the under-weight girls had severe anaemia.

Table 9 describes the association between menstrual related problems with BMI.

Acne and hirsutism were more prevalent in over-weight girls followed by normal-BMI, premenstrual symptoms are more in normal weight girls. 33.4% of the over-weight girls had acne. **X2=49.59p=0.001.** The association between BMI and menstrual related problems was statistically significant.

Table 1: Prevalence of Under-Weight And Over-Weight Girls

BMI	N	Percent
<18.5(under-weight)	35	17.5%
18.5-24.9(normal)	147	73.5%
>25(over-weight)	18	9.0%
Total	200	100%

Table-2 Relation between Dietary Habits and Body Mass Index

Dietary habits	BMI			Total
	<18.5	**18.5-24.9**	**>25**	
Junk food	1(2.9%)	25(17%)	11(61.1%)	37
Traditional food	34(97.1%)	122(83%)	7(38.9%)	163
Total	35	147	18	200

Table 3: Distribution of girls by age of menarche

Age of menarche	N	Percent (%)
11-12years	123	61.5
13-14years	76	38
15-16years	1	0.5
Total	200	100

Table 4: Comparison of BMI and Age of Menarche

Age of menarche	BMI			Total
	<18.5	**18.5-24.9**	**>25**	
11-12yrs	26(74.3%)	86(58.5%)	11(61.1%)	123
13-14yrs	9(25.7%)	61(41.5)	6(33.3%)	76
15-16yrs	0	0	1(5.5%)	1
Total	35	147	18	200

Table 5: Menstrual Problems in the Study Participants

Dysmenorrhea (n=200)	N (%)
Yes	67(33.5%)
No	137(68.5%)
Cycles	
Regular	101(50.5%)
Irregular	99(49.5%)
Menstrual days	
<3 days	2(1%)
3-8 days	156(78%)
>9 days	42(21%)
Premenstrual symptoms	
Yes	43(21.5%)
No	157(78.5%)

Table 6: Relation between Menstrual Disorders and BMI

VARIABLE	BMI		
	<18.5	**18.5-24.9**	**>25**
Dysmenorrhea			
Yes	12(34.3%)	54(36.7%)	1(5.6 %)
No	23(65.7)	93(63.3%)	17(94. 4%)
Cycle frequency			
Frequent cycle	3(8.6%)	3(2%)	0
Regular	12(34.3%)	88(59.9%)	1(5.6 %)
Infrequent	20(57.1%)	56(38.1%)	17(94. 4%)

Table 7: Relation between Thyroid Dysfunction and BMI

Thyroid disorder	BMI			Total
	<18.5	**18.5-24.9**	**>25**	
Hypothyroid	13(37.1%)	20(13.6%)	1(5.6%)	34
Euthyroid	22(62.9%)	127(86.4%)	17(94.4%)	166
Total	35	147	18	200

Table 8: comparison of BMI and anaemia

Anaemia	BMI			Total
	<18.5	18.5-24.9	>25	
Normal	0	6(4.1%)	1(5.5%)	7
Mild anaemia	9(25.7%)	95(64.6%)	16(88.9%)	120
Mod anaemia	21(60%)	39(26.5%)	1(5.5%)	61
Severe anaemia	5(14.3%)	7(4.8%)	0	12
Total	35	147	18	200

Table 9: association of menstrual related problems with BMI

Associated problems	BMI			Total
	<18.5	18.5-24.9	>25	
Acne	0	2(1.4%)	6(33.4%)	8
Hirsutism	0	1(0.7%)	0	1
PMS	4(11.4%)	38(25.8%)	1(5.5%)	43
No	31(88.6%)	106(72.1%)	11(61.1%)	148
Total	35	147	18	200

DISCUSSION

In the present study there was a statistically significant relationship observed between BMI and menstrual pattern. 200 adolescent girls aged between 12-19yrs were included in the study, and the study participants were classified based on BMI into under-weight (<18.5), normal (18.5 to 24.9), and over-weight girls BMI>25) according to WHO.

17.5% of the girls were under-weight, 73.5% were normal weight, and **9%**of the girls were over-weight. 66.7% the over-weight girls belong urban population and 33.3% belongs to rural population, comparable with other studies [4-5]

Socioeconomic status: 49% and 38% of the girls belongs to class-III, IV respectively, and 50% of over-weight girls belong to class-III and 16.7% over-weight belongs to class-II according modified kuppuswamy classification.

The mean age at menarche was 12.3 yrs in the study participants and the age of menarche is influenced by hereditary pattern, dietary habits, lifestyle, race, psychological factors.

In the present study 74.3% of under-weight girls, 58.5% of normal weight girls, 61.1% of over-weight girls attained menarche at 11-12 years of age, which is similar to other studies [6-14].

The menstrual cycles were found to be regular in 50% of the girls, infrequent in 46%, frequent in 3% and 0.5% of the girls had secondary amenorrhea.

Duration of flow was 3-8 days in 78% of girls, >9 days in 21% of the girls, and in 1% of the girls with duration of flow was <3days. [16-18]

One of the common problems in girls was dysmenorrhea, which was reported by 33.5% of the girls which was spasmodic in nature.Of them 29.8% with grade-I dysmenorrheal50.7% with grade II dysmenorrheal 19.4% with grade III dysmenorrheal,19.4% of the girls with grade -III dysmenorrhea they require analgesics for pain relief. In the present study puberty menorrhagia prevalence was 12.5%, of which 68% belongs to rural population, 20% were under-weight, 4.5% were over-weight.

In girls with puberty menorrhagia 28% had infrequent cycles 68% had regular cycles and 4.5% had frequent cycles. Duration of flow in 68% of the girls was more than 9 days.

In Girls with puberty menorrhagia

- 1 girl was with systemic lupus erythematosus.
- 2 girls with coagulation abnormalities
- 5 girls with hypothyroidism

44% of the girls with puberty menorrhagia had severe anaemia.

In the present study dysmenorrhea found to be more in normal weight girls followed by under-weight girls 34.2% of under-weight girls were suffering from dysmenorrhea out of them 5.7% needed analgesics and abstained from school.

36.7% of normal weight girls were suffering from dysmenorrheal out of them 10.8% were suffering from severe dysmenorrhea. Comparable with other studies [15-23].

In the present study Premenstrual syndrome was complained by 21.5% of the girls. 11.42%, 25.85%, 5.5% of underweight, normal and over-weight girls respectively had PMS[25]

Hyper androgenic features were found in 4.5% of the girls. Out of them 1.5% of normal weight girls had hyper androgenic features 3.0% of over-weight girls [24,26]

In the present study PCOS -the prevalence of PCOS was 6.5%. 6.5% girls satisfied Rotterdam criteria of PCOS.[26-28]

-4.5% with oligo/amenorrhea and clinical hyper androgenism
-6.5% with oligomenorrhea and USG polycystic ovaries.
-2.0% with USG polycystic ovaries and clinical hyper androgenism
-2.0% with all the features

CONCLUSION

Menstrual irregularities are common in first 2 years after menarche due to immature HPO axis. In present study half of the adolescent girls had irregular cycles and abnormal BMI.

Menstrual problems like heavy menstrual bleeding, frequent cycles, infrequent cycles, and amenorrhea are common in both over-weight and under-weight girls. Present study concludes that there is a positive correlation between BMI and menstrual problems. 33% over-weight girls had clinical hyper androgenic features, irregular-cycles, and had USG findings suggestive of polycystic ovarian morphology.

These menstrual abnormalities can have psychosocial impact on adolescent girls and women like

social withdrawal, psychological problems, low self-esteem, and work abstinence.

Understanding of the above problems and timely interventions are needed to address the problems and organizing health education programs to students, by social health nurses and clinician to orient them about leading factors of obesity and its complications on menstrual disturbances.

Interventions for life-style modification like regular physical activity, stress management, decreasing the intake of junk food, promoting healthy eating habits and maintaining optimal BMI to improve health in all aspects to maintain the menstrual regularity.

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