

Menstrual Abnormalities and its Relation to Body Mass Index Among Adolescent Girls

Original
Article

Hatem Elgendy, Samar Ali and Ali Abdel Ghany Bendary

Department of Obstetrics and Gynecology, Faculty of Medicine, Benha University, Egypt

ABSTRACT

Background: Menstrual abnormalities create great anxiety among the adolescent females and their families. These irregularities may affect physical, psychological and social well-being and may result in work-related problems for females. High BMI is associated with oligomenorrhea, irregular menstrual cycle and menorrhagia and low BMI is associated with amenorrhea and polymenorrhea.

Aim of Study: The aim of this study was to improve health of adolescent girls through find the relationship between menstrual irregularities and body mass index.

This study was a case control study 132 girls (66 girls in the cases group and 66 girls in the control group) were involved in this study .Menstrual history and BMI were measured for each one.

Results: Most cases group were overweight (22.7%), obese (24.2%). The common menstrual abnormalities among cases group were heavy flow (26.5%) irregular length of cycle (23.5%),long length of cycle (17.4%) (oligomenorrhea) and long days of flow (16.7%). High BMI ($\geq 95^{\text{th}}$ percentile) are the most significant risk factors of these common abnormalities among adolescent.

Conclusion: High BMI ($\geq 95^{\text{th}}$ percentile) are the most significant risk factors of common cycle abnormalities among adolescent.

Key Words: Adolescent girls, BMI, menstrual abnormalities.

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Corresponding Author: Ali Abdel Ghany Bendary, Department of Obstetrics and Gynecology, Faculty of Medicine, Benha University, Egypt **Tel.:** +2 01006768003, **E-mail:** Bendary2021@gmail.coml

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INTRODUCTION

Between childhood and adulthood, adolescence is a time of maturation, a stage of physical, emotional, social, and psychological development that is marked by significant hormonal changes. It is regarded as including the years between 10 and 19^[1].

The adolescent's growth spurt, gonadal growth, the development of secondary sexual organs and traits, changes in body composition, and the expansion of the respiratory, circulatory, and muscular systems are the primary physical changes during this time. The beginning of adolescence is typically accompanied by the onset of puberty and the development of secondary sex traits. In terms of sexual and reproductive maturity, it is also a formative period that affects a person's reproductive health and well-being for the rest of their life^[2].

Menarche is the most significant occurrence in a teenage girl's life throughout her entire era of adolescence. For most women, the menarche—the onset of their first menstrual period—marks the beginning of puberty. The

menarche signals the start of physical, physiological, and psychological changes in adolescent girls' life^[2].

General health, genetic, socioeconomic, environmental, and nutritional factors all affect when a woman reaches menarche. Menarche normally occurs between the ages of 12 and 13. The first cycles after menarche are frequently irregular, with the interval between the first and second cycles being especially large. It is believed that the early menstrual cycles are ovulatory, with the frequency of ovulation being correlated with the length of time from menarche and the age at menarche^[3].

The menstrual cycle is a regular physiological process that is characterised by the cyclic and periodic loss of progesterone-containing endometrium and blood, both of which are additional vital signs. It is a useful tool for assessing healthy growth and ruling out pathological conditions in young girls and adolescents^[4].

After menarche, there are a number of common menstrual abnormalities include menstruation irregularities, dysmenorrhea and premenstrual syndrome^[5].

Menstrual abnormalities are affected with psychosocial stress, physical exercise, body weight, age of menarche and endocrine disturbances^[6].

Body Mass Index (BMI) or Quetelet index: Is a number calculated from weight and square height. If BMI less than 18.5kg/m² it is considered underweight. If BMI between 18.5 – 24.99 kg/m² is considered Normal and if more than 25 kg/m² it is considered overweight^[7].

Abnormal BMI may cause irregularities in menstrual flow, amenorrhea, polymenorrhea, oligomenorrhea, menorrhagia and anovulation^[8].

AIM OF STUDY

Improve health of adolescent girls through find the relationship between menstrual abnormalities and body mass index.

SUBJECTS AND METHODS

Technical design

Study design

A case control study.

Study setting

This study was carried out at two randomly selected secondary public schools in Banha university hospitals from December 2022 to June 2023.

Target population and criteria of inclusion

The current study was conducted on secondary school student girls aged (15-18 years old).

Student girls were selected according to the following criteria

Inclusion criteria for cases group

Adolescent girls with either abnormal duration of menstrual cycle, abnormal duration of menstrual flow, abnormal amount of menstrual flow or more than one of them . They have no chronic diseases.

Inclusion criteria for Control group

1. Adolescent girls with normal length of cycle(between 21 and 35 days), normal days (3-5 days) and amount of flow (average flow of 50-200 ml which fill 3 to 5 pads per day) and with

no passage of clots .They are free of any chronic diseases.

2. They were selected from the same classes from which the cases group selected to be similar to cases group in age and educational level.

Dysmenorrhea and premenstrual symptoms were assessed in both groups.

Exclusion criteria

Girls not attain menarche, married, had primary or secondary amenorrhea or girls suffer from any chronic health condition (take medication more than one month).

Sample size

The sample size was 132 secondary school girls (66 girls in the cases group and 66 girls in the control group). it was calculated using EPI-INFO program version 6 taking into account that the percent of menstrual abnormalities among normal weight adolescent girls is 24.3% and the percent of menstrual abnormalities among overweight adolescent girls is 41.2%. assuming 95% confidence interval and 80% power of the test.

Study tools

Menstrual history

The details of menstrual history were included: age of menarche, dysmenorrhea, premenstrual symptoms which are typically include both psychological and physical symptoms.

Physical symptoms as nausea and vomiting, abdominal bloating or swelling, breast tenderness and headache.

Anthropometric measurements

The weight and height were measured to calculate the body mass index(BMI).

Operational design

In the first visit for each school, permission was taken from the school authority. After that, student girls in the classes that selected for the sample were interviewed and clear explanation of the nature and the aim of the study were given to obtain their verbal consent then all asked who not attained menarche and who treated from chronic diseases for more than six months and if anyone married and those were all excluded from study and.

Data management

Scoring of student 'menstrual history

Normal menstrual cycle: Cycle that occurs regularly every 21-35 days in which the menstrual flow lasts for 3-5 days with an average flow of 50-200 ml which fill 3-5 pads per day.

Abnormal menstrual cycle: any deviation from cyclic occurrence of menstrual cycle, days of flow or amount of flow as above.

Menstrual abnormalities definitions are

1. Menorrhagia: Denotes regularly timed episodes of bleeding, which are either, excessive in amount (>500ml) &/or, in days of flow (>5 days).
2. Hypomenorrhoea: Denotes regularly timed episodes of bleeding but scanty in amount or duration of menstrual flow which last for 1-2 days.
3. Oligomenorrhoea: Infrequent menses with cycle length >35 days.
4. Polymenorrhoea: Frequent menses with cycle length <21 days.
5. Dysmenorrhoea: cramping pain in the lower abdomen occurring at the onset of menstruation.
6. Premenstrual symptoms: complex set of symptoms which include physical and psychological changes of varying severity.

BMI was scored as follow

If BMI was less than 5th percentile it was considered underweight and was scored (1). If BMI was from 5th percentile to less than 85th percentile it was considered normal weight and was scored (2). If BMI was from 85th to less than the 95th percentile it was considered overweight and was scored (3). If BMI equal to or greater than the 95th percentile it was considered obese and was scored (4).

RESULT

There is no significant difference between cases and control groups as regard age, and social class (Table 1). there is no significant difference between cases and control groups as regard age, and social class (Table 1). there is statistically significant higher percentages of late age of menarche, dysmenorrhoea and premenstrual symptoms among cases more than the control group with mean age of menarche (13.0) years among cases and (12.8) years among

control group but with no significant difference. (Table 2). depressed mood (69.4%) and headache (63.3%) represent the highest percentage among premenstrual symptoms in cases group. While breast tenderness (80%) and abdominal bloating (70%) represent the highest percentage among premenstrual symptoms in control group (Table 3). cases were significantly more overweight compared to control group. (Table 4). obesity (BMI >95th percentile) are the most significant risk factors of irregularity of menstrual cycle, heavy menstrual flow and dysmenorrhoea. (Table 5).

Table 1: Socio demographic characteristics of both cases and control groups

Characteristics	Case group N= 66		Control group N= 66		χ^2	P value
	%	N.	%	N.		
Age (y):						
15-	37	56.1	39	59.8		
17-18	29	43.9	27	40.2	0.503	0.918
Mean± SD	(16.1818±0.93137)		(16.250±0.91947)			
Socioeconomic Level:						
■ Low (<50%)	14	42.4	24	36.4	1.106	0.575
■ Middle (50%-<75%)	19	28.8	20	30.3		
■ High(≥75%)	19	28.8	22	33.3		

Table 2: Distribution of menstrual history among cases and control groups

Menstrual History	Case group N= 66		Control group N= 66		OR	95% CI
	%	N.	%	N.		
Age of menarche (y)						
■ Average	49	78.8	45	68.9	0.508	0.277-0.929
■ Early	11	16.7	19	28.8	3.676	1.005-13.448
■ Late	6	4.5	2	2.3		
Mean± SD	13.0±1.076		12.8±1.044		(t test 1.78)	(P value 0.183)
Dysmenorrhoea						
■ Present	31	47.0	15	22.7	3.011	1.770-5.124
■ Absent	35	53.0	51	77.3		
Premenstrual symptoms						
■ Present	24	37.1	10	15.2	3.306	1.828-5.979
■ Absent	41	62.9	56	84.8		

Table 3: Distribution of premenstrual symptoms among cases and control groups

Symptoms	Case group N=24		Control group N=10	
	N.	%	N.	%
Breast tenderness	14	57.1	8	80.0
Bloating or swelling of abdomen	15	61.2	7	70.0
Nausea and vomiting	13	53.0	4	45.0
Headache	15	63.3	1	10.0
Dizziness	10	40.8	2	15.0
Depressed mood	17	69.4	3	35.0

Table 4: Distribution of BMI among cases and control groups

Body mass index(BMI)	Case group N= 66		Control group N= 66		OR	95% CI
	%	N.	%	N.		
■ Normal weight	23	34.8	29	59.8		
■ Underweight	12	18.2	13	19.7	1.585	0.816 - 3.077
■ Overweight	15	22.7	8	11.4	3.434	1.674 - 7.046
■ Obese	16	24.2	6	9.1	4.579	2.149 - 9.758

Table 5: Logistic regression analysis of risk factors of abnormalities of cycle

irregularity of cycle.	Mean ±S.E	Wald test	P value
Overweight (85 th -<95 th percentile)	0.91±0.45	1.45	0.22
Obesity (≥95 th percentile)	0.54±0.232	15.65	0.001
Late age of menarche	0.007±1.0	0.22	0.09
Underweight (<5 th percentile)	0.72±0.52	5.123	0.24
heavy menstrual flow.	Mean ±S.E	Wald test	P value
Overweight (85 th -<95 th percentile)	-0.226±0.734	0.095	0.8
Obesity (≥95 th percentile)	0.9443.516	13.867	0.001
Underweight (<5 th percentile)	1.272±0.562	5.123	0.24
dysmenorrhea.	B±S.E	Wald test	P value
Overweight (85 th -<95 th percentile)	0.580±0.326	0.221	0.64
Obesity (≥95 th percentile)	0.316±1.197	14.301	0.001≥
Underweight (<5 th percentile)	1.272±0.562	5.123	0.24

DISCUSSION

Menstrual abnormalities create great anxiety among the adolescent females and their families and also may affect their physical, psychological social and reproductive health. These are related to several factors including body weight, percentage fat distribution, dietary habits and psychosocial stress^[9].

Nutritional status is frequently associated with abnormalities of menstruation among the females in different age groups. There is high prevalence of malnutrition among adolescent girls which is associated with reproductive problems in adolescent girls^[10].

In the current study :Socio demographic classification of studied groups showed that, low social class constitute highest percentage among studied cases (42.4%) as well as of control group (36.4%) and there is no statistical significant difference between cases and control group

This finding is shared with the study of Mohite *et al.*,(2018) in India who reported that there was no association observed between menstrual abnormalities and socioeconomic status of female students^[11,12].

Menstrual history of studied groups

Age of Menarche

This study demonstrated that the most frequent age of menarche among cases and control groups is from 12-13 years old (78.8% in cases & 68.9% in control) with mean age of 13.0 years for cases and 12.8 years for control group. This finding is in agreement with Nooh *et al.*, (2014) in Egypt who reported that most student girls in University were with average age of menarche (12-13 y).

There is statistically significant higher percentage of late age of menarche among cases more than the control group. Due to late age of menarche is associated with immaturity of hypothalamo-pituitary- ovarian axis leading to anovulatory cycles with prolonged or irregular length of cycle and prolonged or excessive flow^[9].

Dysmenorrhea

As regard dysmenorrhea, (47%) and (22.7%) of cases and control groups respectively had dysmenorrhea and the difference between them was statistically significant . This is due to dysmenorrhea is associated with menstrual abnormalities especially heavy and prolonged menstrual flow^[13].

The most important risk factor for irregular cycle length, lengthy cycle length, heavy menstrual flow, extended days of menstrual flow, and passage of clots, according to a logistic regression study of risk factors for menstrual irregularities, was obesity. Excessive blood loss has been linked to ovulatory abnormalities, which are more prevalent in obese women, and may be related to underlying hormonal irregularities, such as hyperandrogenemia, which is how the prior results were explained^[14].

The previous results are supported by Santos *et al*, (2015) who reported that obesity is strongly associated with occurrence of prolonged and excessive blood loss with passage of clots^[15]

The results go hand in hand with Hala *et al.*, (2019) who reported that obesity (20.3%) was significantly associated with excessive blood loss ($p<0.001$)^[16].

These findings also are in agreement with, Santos *et al*, (2015)who reported that obesity was significantly associated with prolonged and excessive blood loss with passage of clots^[15].

CONCLUSION

Body weight and dietary had found to have significant effect on menstrual characteristics and this gives us a

scope for primary prevention of menstrual irregularities involving lifestyle modification like regular physical activity, promoting healthy eating habits and this should be emphasized in school health education programs to improve menstrual health.

CONFLICT OF INTERESTS

There are no conflicts of of interest.

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