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The Body Mass Index and Menstrual Problems among Adolescent Students

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Abstract: *Menstruation is an important part of female reproductive cycle but menstrual problems in adolescent girls may affect normal life of adolescent and young adult women. Many factors play a role in regularity and flow of menstrual cycle, which include hormonal changes, genetics and body mass index (BMI).*

Objective: *Objective was to assess the relationship between body mass index and menstrual problems.*

Design: *the current study was a cross sectional study carried out between October 2014 to April 2015.*

Setting: *The study was conducted in four governmental secondary and preparatory schools, which represent one district of Port Said City, together with the Faculty of nursing at Port-Said, Egypt. A purposive sample of 366 female students who attained menarche was selected from the above-mentioned settings.*

Results: *The mean age of the girls was 14.9 years and more than two thirds (66.7%) had regular menstrual cycle, while 33.3% of them had irregular menstrual cycle. The majority of the sample (82.8%) complained of premenstrual symptoms. As regards BMI ranged between 18.3 - 33.9 kgandcm2, 53.8% had normal weight, while 33.9%, 12.0% were overweight & obese. Relationship between BMI and menstrual problems. A statistically significant relationship was found between BMI menstrual irregularity (P = 0.0001) and BMI and severity of premenstrual symptoms excess body hair (P=0.007, 0.03 respectively).*

Conclusions: *Based on the result current study concluded that, BMI play a very important role for menstrual cycle regularity. Therefore, adolescents have to give healthy & balance nutrition leads to maintain the normal BMI and regulate their menstrual cycle. The body weight and socio economic status has significant relation with menstrual problems.*

Recommendations: *lifestyle modification and nutritional counseling for female students could alleviate menstrual problems. It will not only improve the girls current health, sense of well-being and overall quality of life but may also lower her risks for future disease and ill health after proper advice about diet and exercise, further research in nutritional pattern in adolescents can be done.*

Keywords: *BMI, Menstrual problems, Adolescents female.*

I. Introduction

Menstruation occurs once a month as a regular rhythmic period and remains as a normal physiological phenomenon from menarche to menopause. It is regulated by cyclical changes in female sex hormones and regularity of menstrual cycles reflects changes in the level of these hormones ***(1).*** Menarche is the first menstrual period; it is generally occurring between 11-15 years. It is the time when there are sudden changes in their body and the changes bring along problems with them. The most challenging problems are related to menstruation; in girls ***(2).***

Factors that often play a role in the regularity and flow of a woman's menstrual cycle include hormonal changes, genetics, serious medical conditions and BMI. Moreover, psychological well-being is known to influence the age of menarche and common menstrual problems ***(3, 4).***

Menstrual problems include; menstrual cycle irregularities (of duration or length), hyper- or hypomenorrhoea, poly- or oligomenorrhoea, dysmenorrhoea, amenorrhoea, menorrhagia and premenstrual syndrome ***(5).*** They affect the quality of life of adolescents and young adult women, especially those who suffer dysmenorrhea and heavy menstruation. The World Health Organization reports that 18 million women aged 30–55 years perceive their menstrual bleeding to be excessive ***(6).*** A high proportion of women in other studies reported suffering oligomenorrhoea or amenorrhoea and these have been associated with BMI ***(7)*** and other complications such as polycystic ovary syndrome (PCOS), hirsutism or infertility **(3).** Moreover, **Dars et al., 2014 [(8),]** cross sectional study on Relationship of Menstrual Irregularities to BMI and nutritional status in adolescent girls", found that 75.5% girls with BMI 14-24.9 had a normal menstrual pattern. All sixteen girls with a BMI of 25 – 29.9 kg/m2 had infrequent cycles. A statistically significant relationship was observed between BMI and menstrual pattern. According to WHO the BMI of age group 12 to 17 years old has raised

from 5.7% on 2009 to 11.1% on 2011 around the world, this had profound impact on female reproductive health ***(9)***.

Menstrual problems are generally perceived as only minor health concern and thus irrelevant to the public health agenda particularly for women in developing countries who may face life-threatening conditions. Although they are diagnosable and mostly treatable even at peripheral level in early stage, they are often ignored by primary health care in most of the developing countries ***(10)*** Such disorders also have economic consequences in terms of health care costs due to the consumption of expensive hormonal drugs and laboratory tests ***(11).***

I.1.Significance of the study:

Menstrual health is fundamental to women's sexual and reproductive health. Identification of abnormal menstrual patterns through adolescence by a nurse midwife may permit early identification of potential health concerns for adulthood. It is, therefore, necessary to clarify what factors are associated with menstrual irregularities in order to assist in improving their quality of life. Moreover, her effort in counseling adolescent females about weight reduction can be effective in alleviating the menstrual disturbances. Given the rising prevalence of overweight and obesity in Port Said, it is important to investigate their effects on female's reproductive health and to better quantify the strength of association with menstrual problems in adolescent sample.

II. Aim of the Study

The aim of this study is to assess the relationship between Body Mass Index and Menstrual Problems among adolescent girls.

III. Subjects and Methods

3. 1 Research design: A case-control design was adopted in this study**.**

3. 2 Setting: The present study was conducted at Port Said governmental secondary and preparatory schools for girls and Faculty of Nursing in Port Said City.

3. 3 Subjects: A purposive sample of 366 female students was selected for this study**.** Students were eligible for recruitment in the study if they met the following inclusion criteria:

1. Adolescent females.
2. Age ranging from 12-18 years.
3. Free from abnormal puberty.
4. The student is not pregnant or breastfeeding

Any deviation from these criteria was excluded.

3. 4 Sampling Size:

Since the prevalence of adolescent females in Port Said City was 13. 7 % as reported by Agency of Public Mobilization and Statistical ***(CAPMAS, 2012 (12)***, this substituting in the following equation:

$$\textbf{Sample Size (n)} = \frac{\textbf{Z (Pq)}^2}{\textbf{d}^2}$$

Where*:*

Z: 1.96

P: Prevalence of adolescent females

q: (1-13. 7) *(1-P)*

d: Is width of the desired sample confidence interval = 0.098.

$\mathbf{d}^2$: 0.00960

n: = **366** adolescent females

3. 5 Tools of Data Collection:

A self-administered, structured, anonymous questionnaire was designed for the study.

The questionnaire covered information about the following demographic variables: age, marital status, residence and presence of pregnancy and breastfeeding (to rule out the cause of amenorrhea if present).The participants were then asked about the characteristics of their menstruation: age of menarche, regularity/irregularity of menstruation in interval and duration; amount of blood loss (number of pads used); pain during menstruation and degree and location of pain; activity during menstruation; symptoms of PMS, whether the symptoms disappear after menstruation.

Menstrual Disorders and Body Mass Index were defined as follows:
Regular menstruation: cycle repeated about once every 28–32 days with duration 3–7 days.
Oligomenorrhoea: cycle monthly repeated about once every > 32 days.
Polymenorrhoea: cycle repeated about once every ≤ 21 days.
Hypomenorrhoea: duration of period < 3 days and slight blood loss (using < 1 pad).
Hypermenorrhoea: duration of period > 7 days and blood loss > 80 mL (using ≥ 5 pads)

Premenstrual Menstrual syndrome (PMS): are the cyclic recurrence of physiological behavioral or somatic symptom. They start few days premenstrual and relieved by the onset of menstruation. They include; nervous and gastrointestinal symptoms, edema, weight gain and breast symptoms**. *(13, 14).***

Weight: was measured in kilogram, without footwear using a regularly standardized beam balance. Checks on the scale were made routinely before recording the weight of each girl. **Height**: was also taken barefooted in centimeter using standard measuring tape fixed vertically. It was recorded to the nearest 1 cm to avoid possible error.

Body Mass Index (BMI): was calculated as weight in kg/height in m2. According to BMI, nutritional status was classified as overweight (over nourished), normal and undernourished as BMI more > 25, 18.5-24.99 and < 18.5 kg/ height in m2 respectively ***(15, 16).***

a. ***Validity and Reliability***

Tool was reviewed by a panel of five experts in the field of Obstetrics and Gynecological Nursing to test its content validity. Modifications were done accordingly based on their judgment. Confirming the stability of the questionnaire, Cronbach's alpha was used because it gives the minimum reliability coefficient scale, beside it does not require reapplication, and it has been shown that the Cronbach's alpha coefficient equal to 0.0653 is an excellent factor in such study.

b. ***Administrative and ethical consideration***

An official permission was granted by submission of an official letter from the Faculty of Nursing to the responsible authorities of the study setting to obtain their permission for data collection. All ethical issues were taken into consideration during all phases of the study; the researcher maintained an anonymity and confidentiality of the subjects. The inclusion in the study was totally voluntary. The aim of the study was explained to every student before participation, oral consent was obtained from every student prior to data collection. Students were assured that the study maneuver would cause no actual or potential harm to her. Also, they were assured that professional help will be provided for them whenever needed. Students were notified that they can withdraw at any stage of the research.

3. 8 Pilot study:

A pilot study was carried out on 10% of the sample (who were excluded from the sample) to assess the clarity and applicability of the data collection tools, arrangements of items, estimate the time needed for each sheet and the feasibility of the study and acceptance to be involved in the study. Necessary modifications were undertaken.

3. 9 Field study:

Collection of data covered a period of six months from October 2014 to April 2015. The researcher attended the above-mentioned setting on three days (Saturday, Monday, and Wednesday) per week; the tool was self-answered. The time needed by the researcher for the completion of the questionnaire sheet was ranged from 20-30 minutes, girls interviewed ranged between 1 to 6 students per day.

3. 10 Statistical design:

Data entry and analysis were done using the statistical package for social science (SPSS), version 16.0. Quality control was done at the stages of coding and data entry. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables, and means and standard deviations, chi-square and p-value for quantitative variables.

IV. Results

The results obtained from the current study are categorized as follows: demographic characteristics; menstrual characteristics; premenstrual syndrome; pattern of body mass index. In addition, the relationship

between BMI and menstrual problem. The findings of the present study gathered were tabulated, analyzed and interpreted using both descriptive and inferential statistics.

Table (1): Distribution of the studied group according to their demographic characteristics (n=366)

Characteristics	No.	%
Age (years)		
12 -	159	43.4
15 – 18	207	56.6
Min. – Max.	12.0 – 18.0	
Mean ± SD	14.9 ± 2.1	
Family income (L.E.)		
Sufficient	157	42.9
Insufficient	209	57.1
Crowding index: crowded not crowded	 361 5	 98.6 1.4
Min-Max Mean±SD	2 - 5 2.4 ±1.01	

Table 1: shows that more than half of the students were 15 years old and more (56.6%) with a mean of 14.9±2.1 years. Meanwhile, they mostly had insufficient income and living in crowded homes.

Figure (1): Distribution of the studied sample according to the pattern of menstruation

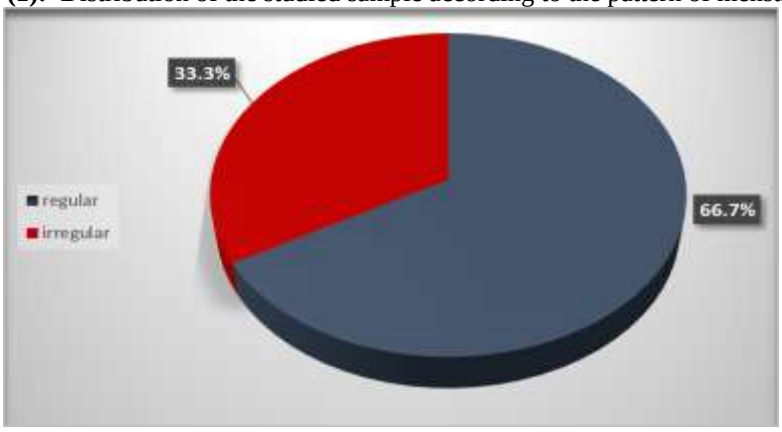

Figure 1: demonstrates that out of 366 adolescents 244 (66.7%) had regular and 122 (33.3%) girls had irregular menstrual cycles.

Table (2): Distribution of the studied group according to their menstrual characteristics (n=366)

Items	No.	%
Age of menarche		
9-11	101	27.6
11-<14	230	62.8
Don't know	35	9.6
Regularity of menstrual cycle		
Regular	244	66.7
Irregular	122	33.3
@**Irregularity of menstrual cycle (N= 122)**		
• Excessive Amount of menstrual blood flow	20	16.3
• Little Amount of menstrual blood flow	55	45.0
• Long Duration of menstruation	33	27.0
• Long interval between menstrual cycle	32	26.2
• Short interval between menses	30	24.6
Number of perineal pads per day		
One	52	14.2
Two	200	54.6
Three or more	114	31.2
Duration of menstruation(days)		
< 2	30	8.2
3 – 7	262	71.6
≥8	74	20.2

@ Students had more than one answer

It is obvious in **table 2** that lowest and highest age at menarche was below 11 and above 15 years respectively with the mean age at menarche of 12.8 ± 1.06 years. Meanwhile, 45.0% had little amount of menstrual blood and 16.3% had menorrhagia (profuse bleeding). Partially equal percentage of participants suffered from long duration and long interval of menstrual cycle (27.0% and 26.2% respectively).

Table (3): Distribution of the studied adolescent girls according to their reported premenstrual syndrome (n=366)

Symptoms	**No**	**%**
Premenstrual syndrome		
Yes	303	82.8
No	63	17.2
Symptoms of Premenstrual syndrome		
Physical symptoms: (colic-back pain-headache and exhaustion)	172	56.8
Psychological symptoms: (anxiety- depression-nervous)	95	31.4
Behavioral symptoms: (withdrawal-stay in home- absenteeism)	36	11.9
Severity of Premenstrual syndrome: (n=303)		
Mild	71	23.4
Moderate	132	43.6
Sever	100	33.0
Total	303	100.0

Table 3: shows that the majority of the studied students (82.8%) were exposed to PMS. Of those, physical symptoms was the most common 172 (56. %) followed by psychological symptoms 95 (31.4%) and were severe in one third of the sample (33.0%).

Figure (2): Distribution of the studied sample according to the pattern of their BMI

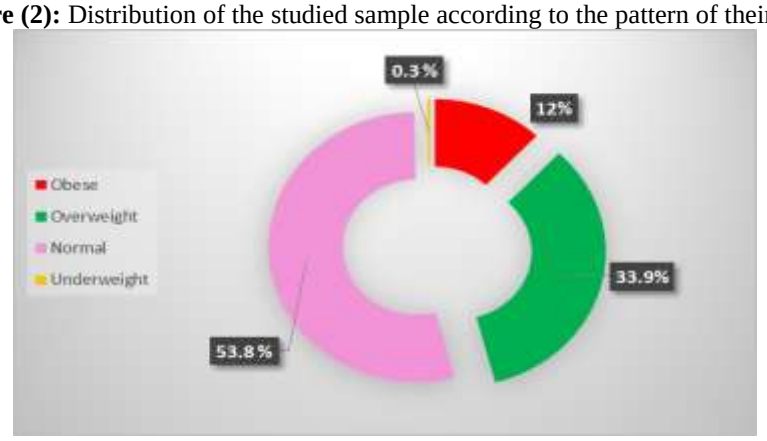

Figure 2: demonstrates that almost half of the studied adolescents were overweight and obese (33.9% and 12.0% respectively) with a mean BMI 25.2±3.5**.**

Table 4: Relationship between Characteristics of Menstruation of the studied adolescent girls and their body mass index" BMI"

Characteristics of Menstruation	**BMI of adolescents (n=365)**						**Significance**
	Normal BMI (n=197)		**Overweight (n=124)**		**Obese (n=44)**		
	No.	**%**	**No.**	**%**	**No.**	**%**	
Age of menarche							
9-11	56	56.0	37	37.0	7	7.0	X^2=3.570
11-<14	121	52.6	76	33.0	33	14.3	P=0.168
Don't know	20	57.1	11	31.4	4	11.4	
Regularity of menses							**X^2=0.985**
Regular	129	65.5	87	70.2	28	63.6	**P=0.01***
Irregular	68	34.5	37	29.8	16	36.4	
#Type of irregularity	**(n=92)**		**(n=50)**		**(n=28)**		
Excessive Amount of blood flow	12	13.1	4	8.0	4	14.3	X^2=2.6 P=0.272
Little amount of blood flow	35	38.1	13	26.0	7	25.0	**X^2=2.95P=0.002***
Long Duration of menstruation	16	17.4	13	26.0	4	14.3	**X^2=0.23P=0.022***
Long interval between menses	19	20.7	5	10.0	8	28.6	**X^2=7.6 P=0.0001***
Short interval between menses	10	10.7	15	30.0	5	17.8	**X^2=4.08 P=0.001***
Frequency of changing pads per day							**X^2=3.302**

Once	23	11.7	22	17.7	6	13.6	^{MC}P=0.051
Twice	115	58.4	62	50.0	23	52.3	
Three pads	59	29.9	40	32.3	15	34.1	
Duration of menses (days)							**X^2=9.309 P=0.05***
Less than 2	19	9.6	10	8.1	1	2.3	
3-7	135	68.5	87	70.2	40	90.9	
8 or more	43	21.8	27	21.7	3	6.8	

X^2: Chi-Square test ^{MC}P: Monte Carlo corrected P-value *significant at P≤0.05

Table 4: shows relationship between BMI and menstrual problems. Students who were obese were more likely to have an excessive amount of blood flow and long interval between the menstrual period (14.3% and 28.6% respectively), compared to those who had normal BMI (13.1% and 20.7% respectively). Meanwhile, students who were overweight (30.0%) were significantly more likely to have short interval between the menstruation compared to those who had normal BMI (10.7%). There was statistical difference between all comparisons except age of menarche and Frequency of changing pads per day.

Table 5: Relationship between Premenstrual syndrome of the studied adolescent girls and their body mass index" BMI"

Premenstrual syndrome	**BMI of adolescents (n=365)**								**Significance**
	Normal BMI (n=197)		**Overweight (n=124)**		**Obese (n=44)**		***Total (n=365)***		
	No.	**%**	**No.**	**%**	**No.**	**%**	***No.***	***%***	
Premenstrual syndrome									X^2=2.252 P=0.324
Yes	159	52.5	108	35.6	36	11.9	***303***	***83.0***	
No	38	61.3	16	25.8	8	12.9	***62***	***17.0***	
Symptoms of premenstrual syndrome	**[n=159]**		**[n=108]**		**[n=36]**		***[n=303]***		X^2=5.455 ^{MC}P=0.243
Physical symptoms	91	57.2	55	50.9	26	72.2	***172***	***56.8***	
Psychological	50	31.5	37	34.3	8	22.2	***95***	***31.4***	
Behavioral	18	11.3	16	14.8	2	5.6	***36***	***11.8***	
Severity of pre-menstrual symptoms	**[n=159]**		**[n=108]**		**[n=36]**		***[n=303]***		**X^2=14.019 P=0.007***
Mild	31	19.5	37	34.5	3	8.4	***71***	***23.4***	
Moderate	73	45.9	38	35.0	21	58.3	***132***	***43.6***	
Severe	55	34.6	33	30.5	12	33.3	***100***	***33.0***	
Suffering from excess body hair									**X^2=0.352 P=0.03***
Yes	82	41.6	50	40.3	20	45.5	***152***	***41.6***	
No	115	58.4	74	59.7	24	54.5	***213***	***58.4***	

X^2: Chi-Square test ^{MC}P: Monte Carlo corrected P-value *significant at P≤0.05

Table (5): Illustrates the relationship between Premenstrual syndrome of the studied adolescent girls and their body mass index" BMI" of There was no statistical difference between Premenstrual syndrome and it's symptoms and body mass index . While, There was statistical difference between severity of premenstrual symptoms and Suffering from excess body hair (P= 0.007), (P = 0.03).

Table (6): Relationship between Socio-demographic characteristics of the studied adolescent girls and their body mass index" BMI"

Socio-demographic characteristics	**BMI of adolescents (n=365)**								**Significance**
	Normal BMI (n=197)		**Overweight (n=124)**		**Obese (n=44)**		***Total (n=365)***		
	No.	**%**	**No.**	**%**	**No.**	**%**	***No.***	***%***	
Age (years)									F=1.200 P=0.302
12-15	91	46.2	52	41.9	15	34.1	***158***	***43.3***	
15-≤18	106	53.8	72	58.1	29	65.9	***207***	***56.7***	
Min-Max	12.0-18.0						***12.0-18.0***		
Mean±SD	14.8±2.2		14.9±2.2		15.4±2.1		***14.9±2.2***		
Family income									**X^2=6.830 P=0.033***
Sufficient	72	36.5	61	49.2	23	52.3	***156***	***42.7***	
Insufficient	125	63.5	63	50.8	21	47.7	***209***	***57.3***	
Number of family members									X^2=0.09 P=0.955
3-4	76	38.6	49	39.5	18	40.9	***143***	***39.2***	
5-6	121	61.4	75	60.5	26	59.1	***222***	***60.8***	
Number of rooms									**X^2=11.627 P=0.020***
1-2	21	10.7	15	12.1	8	18.2	***44***	***12.1***	
3-4	142	72.1	90	72.6	21	47.7	***253***	***69.3***	

5 or more	34	17.2	19	15.3	15	34.1	***68***	***18.6***	
Crowding index (person/room)									F=0.409 P=0.665
1 or less	5	2.5	0	0.0	2	4.5	***7***	***1.9***	
More than 1	192	97.5	124	100	42	95.5	***358***	***98.1***	
Min-Max	1.0-6.0		1.0-6.0		0.7-0.6		***0.7-6.0***		
Mean±SD	2.5±1.0		2.5±1.0		2.3±1.0		***2.5±1.0***		

X^2: Chi-Square test F: ANOVA test *significant at P≤0.05

Table (6): Shows relationship between socio-demographic characteristics of the studied adolescent girls and their body mass index" BMI" of There was statistical difference between family income and number of rooms (P= 0.033, P=0.020) respectively, of adolescent girls and their body mass index.

V. Discussion

Menstruation is a unique female phenomenon, It defines the start and end of reproductive potential ***(17)*** furthermore it is considered as indicator of women's health, so adolescent girls need to have an understanding of menstruation pattern and the factors that may attribute in menstrual disorders or changes like age, weather, activities and body mass index to increase their understanding of menstrual criteria, appropriate management for it and clarify the ignorance of menstruation issues ***(18).*** Based on the previous idea the research team designed the present study, which aimed to assess the relationship between Body Mass Index and menstrual problems among adolescent girls.

In the present study, two third of the adolescent girls had age of menarche ranged from 11- to <14years. With the mean age at menarche of 12.8 ± 1.06 years***. Dars et al.,*** **2014**[8] reported that 67.33 % of the girls had their first menstrual period between the age of 11 and 13 All the girls had experienced menarche by the age of 16 years.

In line with this mentioned that the age of onset of menarche is generally between 11-15 years. Slight variations in the age of menarche may occur according to the nutritional status, hereditary pattern, and climate difference ***(19)***.other study reported that the delayed of menarche in girls had poor nutrition and earlier in girls with high-energy intake. This study is similar with a study conducted to determine the prevalence and pattern of menstrual symptoms among 352 nursing students in Beirut, Lebanon, which reported age of menarche, was 14 years for 23.3% and the he mean menarche age was 13.2 (SD 1.4) years ***(6).***

In the present, study more than one third of adolescent girls had irregular menstrual cycle. 45.0 % had little amount of menstrual blood and 16.3% had menorrhagia (profuse bleeding). Partially equal percentage of participants suffered from long duration and long interval of menstrual cycle (27.0% and 26.2% respectively). The finding is in congruence with the study conducted in Beirut, Lebanon, ***(6),*** where the prevalence of irregular menstrual cycle, polymenorhhea, oligomenorrhea, secondary amenorrhea and menorrhagia was 59.4%, 37.5%, 19.3%, 5.1% and 11.7% respectively.

Furthermore, and in agreement with these present study findings***, Dars et al 2014*** [8]. In respect of regularity of menstrual cycle, it revealed that it was regular in three hundred and five (76%) girls, whereas ninety-six (24%) had irregular cycle .Moreover ***Lee 2006*** [20] reported: After menarche, common menstrual abnormalities that the female adolescent may encounter include dysmenorrhea, irregularities in menstrual flow and premenstrual symptoms. 75% of girls experience some problems associated with menstruation.

Variations for interval between cycle and extent of flow observed as a type of menstrual irregularity in a study from adolescent girls in port said indicated that 24.6% and 26.2% of them encountered shorter (<21)and longer cycles (>35 days), respectively . and there was a statistical significant correlation between their body mass index" BMI" and short & long interval menstrual cycle (P= 0.001). in support to our findings ***(21, 18)*** found that, positive correlation between body mass index and length of menstruation (r = 0.313). Additionally there is positive correlation between BMI & PMS. In congruence with this, ***Mari & Rvlaid 2005***[22] emphasized that; one of the principal factors for the cycle regularity is bodyweight. But, in the study done by ***Bassi et al 2015*** (23) reports, observed 6.6% and 5.6% of the participants in the short and long menstrual periods respectively& No significant correlation could be drawn between cycle interval and BMI. In the first two years after menarche, the Variations in cycle length and duration are a common mainly due to anovulation ***(24).***

Our study concluded that, (45.0%) subjects had excessive amount of blood flow, 16.3% experienced little amount of blood flow and there was a statistically significant relationship observed between BMI and amount of menstrual blood flow. Heavy flow periods make females potentially more susceptible for iron deficiency anemia, which can be avoided by iron supplementation ***(25)***. In congruence with the foregoing, other studies reported that there was a statistically significant relationship observed between BMI and menstrual flow ***(23, 8).***

Menstrual disorders are a common problem in adolescents. These disorders are often the source of anxiety for the adolescents and their families and affects more than 50% of the menstruating women ***(26).*** As regards present of premenstrual syndrome, the majority of girls (82.8%) had premenstrual syndrome, while (56.8%) of them had physical symptoms as (colic-back pain-headache and exhaustion); less than half (43.6%) had moderate severity of premenstrual symptoms. As well as there was statistical difference between the severity of premenstrual symptoms of adolescent girls and their body mass index" BMI" (P= 0.007).Results similar to these current study findings were also reported in a study in ***Hossain et al 2011& Kavitha.2014[27, 28)*** the majority (72.30%) of the girls have premenstrual symptoms. Furthermore, and in agreement with these present study findings ***(29)*** reported that premenstrual symptoms were significantly more common among girls who were overweight, and did not do regular physical activity. There were some studies recognized that there is positive correlation between BMI & PMS. ***(21, 18, 22),*** Furthermore, ***(30*****)** clarified that Almost 75% of their subject indicated having physical symptoms, such as breast tenderness, headaches, joint/ muscle pain, bloating and weight gain and Overall, 91% had at least one symptom of any degree of severity. In addition, 6.4% reported severe interference of at least one symptom.

In line with this ***Kavitha. 2014 [(28)]*** Premenstrual symptoms impact on daily life activities of the adolescent girls which it's a major causes of inability to concentrate on their work or studies, class or school absenteeism, inability to perform in their academic activities like physical training**.** So menstrual disturbance can be considered as one of the major health problems of female students and requires attention, so it is necessary to assessment abnormal menstrual patterns through adolescence and giving health education order to relieve to enhance adolescent student girls quality daily life activities during menstrual periods, lower the risks for future diseases**.** ***(31)*** Added the assessment of menstrual cycle is conceder as an additional vital sign

The anthropometric measurements help to confirm an adolescent's healthy growth and development, or to identify early a potential nutritional or health problem, also is particularly important because it acts as a tool for monitoring and evaluating the hormone-mediated changes in growth and reproductive maturation during this phase of life. Body mass index (BMI) is a commonly used anthropometric measurement to estimate the indices of underweight/overweight) of adolescents and adults ***(32),*** as well as the Body Mass Index (BMI) ranged between 18.3-33.9, (53.8%) were normal BMI, Almost half of the studied adolescents were overweight and obese (33.9% and 12.0% respectively) in our study**.** Were quite high, compared to findings of other studies. ***Goyal et al., 2010 [(33)]***found that prevalence of overweight and obesity in Indian adolescent school going children was found to be 9.2% and 1.5% respectively. A study conducted in Brazil showed that 7.3%were overweight and 4.5% were obese among the adolescent schoolchildren. Results similar to these current study findings were also reported in a study by ***Lakkawar, 2014 [(2)]*** Overweight and obesity was found in 29.5% of the cases, 11% were underweight and 40.5% were of normal weight.

The present study results showed There was statistical difference between family income and number of rooms (P= 0.033, P=0.020) respectively, of adolescent girls and their body mass index. This result may be that the families with a high economic status high intake of food and had more activity saving devices such as televisions,computers, video CD players and automobiles which may reflect physical inactivity ,In congruence with this ***(Dars 2014 (8)*** who reported A statistically significant relationship was found between BMI and social class (P < 0.001) Additional**,** ***Wronka 2013 (34)*** reported that the Students from families of high socio-economic status slightly more often estimated their weight status correctly than students with average and low status. In congruence with the foregoing In the developed countries, a high socio-economic status is correlated with a lower BMI, and girls of high socio-economic status overestimate their body weight by the WHO standards more often than women of low status. According to research conducted among New Zealanders, low socio-economic status is associated with weight underestimation ***(34).***

VI. Conclusion

Based on the result current study concluded that, There was statistical deference between the BMI and irregular menstrual cycle, oligomenorrhea, polymenorrhea and hypomenorrhea and hypermenorrhea (P=0.0001, 0.001, 0.05 respectively). Likewise, there was statistical deference between the BMI and severity of premenstrual syndrome and excess body hair (P=0.007, 0.03 respectively). BMI play a very important role for menstrual cycle regularity. Therefore, adolescents have to give healthy & balance nutrition leads to maintain the normal BMI and regulate their menstrual cycle.

VII. Recommendations

Lifestyle modification and nutritional counseling for female students could alleviate menstrual problems. It will not only improve the girls current health, sense of well-being and overall quality of life but may also lower her risks for future disease and ill health after proper advice about diet and exercise. Promoting healthy eating habits and maintaining normal & optimal BMI should improve menstrual health. Further research in nutritional pattern in adolescents can be done.

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