

**RELATIONSHIP OF BODY MASS INDEX WITH MENSTRUAL CYCLE PATTERN
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ABSTRACT

Background: Disturbance of menstrual cycle is one of the most common gynecologic disorders among adolescent girls and young adult women. The present study was conducted to observe the relationship of body mass index with menstrual cycle pattern among the female students of Dhaka Medical College. **Methods:** This cross-sectional observational study was carried out among 100 randomly selected female students from September 2011 to December 2011 through self-administered structured questionnaire. **Results:** The mean age of the respondents was 23.51 (\pm SD 2.61) years. The mean BMI was 25.79 kg/m². Majority of respondents' BMI was within normal limit (61%); but rests (39%) were either overweight or obese. Minimum age at menarche was 9 years, while maximum age was 16 years with mean 12.27 \pm 1.16 years. Most the respondents' menstrual pattern was regular (79%) and majority (66%) had average menstrual flow. About 68% respondents disclosed that they had dysmenorrhoea with various degree of severity. It is found that 86.9% of the respondents whose BMI was normal menstruate regularly. **Conclusion:** Relationship between menstrual pattern and BMI has been investigated in this study. It is found that overweight is significantly related with irregular menstruation. Female medical students are reluctant to exercise. They should be encouraged to adopt the positive habits of daily physical exercise.

KEYWORDS: Body mass index, menstrual cycle, dysmenorrhea, medical students.**INTRODUCTION**

Menstrual cycle length or pattern of menstrual cycle is a non invasive clinical marker of reproductive function.^[1] It has also been used to assess the effects of environmental and occupational exposure such as organic solvents on reproductive health. Most commonly the length of menstrual cycle is 28 days. But it may vary in length and pattern. Irregular menstrual cycle during puberty have been considered part and parcel of development and have been explained by incomplete maturation of the hypothalamic-pituitary-ovarian axis. During puberty menstrual cycle abnormalities may also be associated with all kind of causes for menstrual irregularity known in adult such as strenuous physical exercise, psychosocial stress, low body weight and endocrine disturbance.

However it has been observed that irregular menstrual cycle and abnormal pattern of menstrual cycle may continue during adulthood and in the end may be associated with sub-fertility.^[2-4]

Body mass index has a great impact on menstrual cycle pattern. One study has shown that out of 200 girls 118 had normal body mass index; out of which 86.4% had normal menstrual cycle. Fifty three girls had Body Mass Index >25; out of them 90.4% had irregular cycle. Nineteen girls had Body Mass Index <18; out of which 42.1% had irregular cycle. The life style, body weight and socio-economic status also have found to have significant bearing on the menstruation pattern; that gives us scope for primary prevention of menstrual problem involving life style modification and educational program.^[5]

In a cross-sectional study the association between the menstrual pattern in ninth grade school girls and age, body mass index and historical parameter was investigated. The survey was held in a combined Urban and rural region, age, low BMI, stress and strain, weight loss of >5 kg were independently associated with irregular menstrual cycle (IMC).^[6]

Data from the Nurses Health Study II showed that BMI > 24.0 Kg/m² at age 18 years is a significant predictor of irregular menstrual cycle or oligomerrhoea from age 18-22 year; and anovulatory infertility later in life.^[7]

The number of anovulatory cycle increases as the degree of excess weight increases.^[8] The median of differences between the longest and the shortest menstrual cycle in one year decreased by age. In adolescents (15-19 years) this is 11 days but in older women 6 days as BMI varies.^[9]

Some study found an overrepresentation of women with intellectual occupation and may present with secondary amenorrhoea.^[10] Study also found that the length of regular menstrual cycle increased with menarche at late age & high BMI.^[11] Study shown that women with longer cycle had higher Body mass Index.^[12]

OBJECTIVES

General

To find out the relationship of Body mass Index with menstrual cycle pattern among medical students.

Specific

- i. To find out the sociodemographic and clinical parameters of medical students.
- ii. To calculate body mass index of medical students.
- iii. To find the relationship between menstrual pattern and BMI.

METHODOLOGY

Study design: Cross sectional study

Place of study: Dhaka Medical College, Dhaka

Period of study: September, 2011 to 30th November 2011

Sample size: One hundred female student of Dhaka Medical College

Collection method: Purposive sampling

Selection criteria

Inclusion criteria

Female Medical students of Dhaka Medical College fulfilling the criteria irrespective of age.

Exclusion criteria

1. Married
2. Not willing to participate
3. Psychological problem
4. Known case of organic lesion e.g. Fibroid uterus or Endometriosis
5. History of taking hormonal medication
6. History of Diabetes mellitus hypertension

Data analysis

All the data were checked and edited after collection. Then data entered into computer, with the help of 'SPSS for Windows' version 12.0. An analysis plan was developed keeping in view with the objectives of the study.

RESULTS

Table 1: Distribution of the respondents according to the year of study in Medical College (n=100)

Students of	Percent
First year	4.0
Second year	17.0
Third year	19.0
Fourth year	16.0
Fifth year	22.0
Internee	22.0
Total	100.0

Table 1 shows the distribution of medical students by year. It is evident from the table that representation increases with high class i.e. Internee and Fifth year students (22% each) responded more in the study than First or Second year students (4% & 17% respectively).

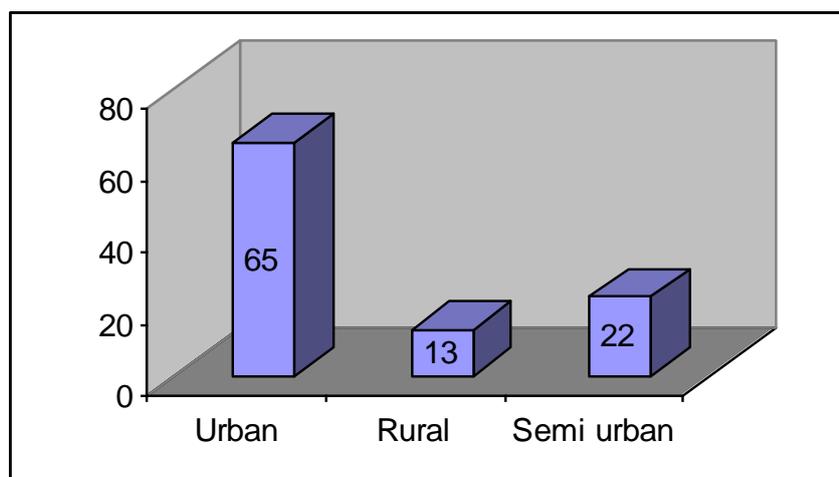


Figure 1: Distribution of the medical college students according to their area of residence (n=100)

Most of the respondents (65%) were from urban areas and 22% were from semi-urban areas. Only 13%

students were from rural locality (Fig 1).

Table 2: Mean age, height, weight, BMI, waist circumference, hip circumference and monthly income of father and mother among female medical students of DMC (n=100)

Demographic variables	Minimum	Maximum	Mean	Std. Deviation
Age	18	32	23.51	2.607
Height in meter	1.20	1.65	1.50	0.114
Weight in kg	40.00	84.00	56.73	7.396
Body Mass Index	18.02	47.81	25.80	6.079
Waist circumference	28.00	100.00	79.86	10.401
Hip circumference	36.00	160.00	97.09	12.695
Monthly income of Father	12000	42000	29480.00	7911.735
Monthly income of Mother (n=26)	8000	32000	20038.46	6737.838

Table 2 shows some demographic variables of the female medical students of DMC. The mean age of the respondents was 23.51 (\pm SD 2.607) years. The mean height and weight of the students were 1.499 (\pm SD .114) meters and 56.73 (\pm SD 7.396) kg respectively. There

mean BMI was 25.79 kg/m². Mean waist and hip circumferences of the respondents were 79.86 and 97.09 cm respectively. Both the parents were earning but the mean monthly income of the fathers was higher (29480 BDT) than that of the mothers (20038 BDT).

Table 3: Distribution of the respondents by BMI (n=110)

BMI Classification	Percent	χ^2	p-value
Normal range (18.50-24.99)	61.0	74.960	<.001
Overweight (25.00-29.99)	22.0		
Obese (\geq 30.00)	17.0		
Total	100.0		

Table 3 shows classification of the respondents according to their body mass index. Majority of respondents' BMI was within normal limit (61%); but

rests (39%) were either overweight or obese. Statistically, this difference was highly significant ($\chi^2 = 74.960$ (df=3); p <.001).

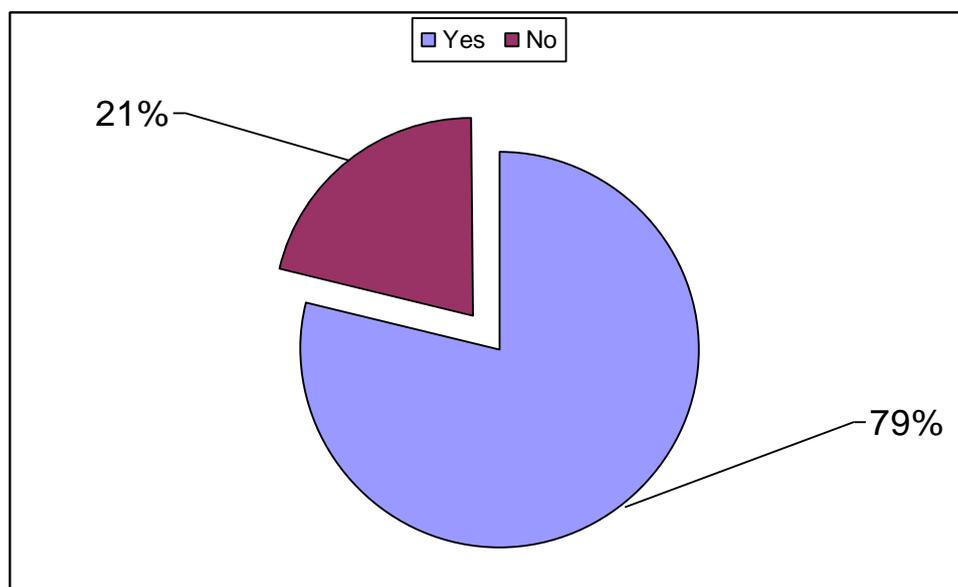
**Figure 2. Distribution of the respondents according to the regularity of menstruation (n=100)**

Figure 3 shows the menstrual pattern of the female medical students and internee doctors of Dhaka Medical College. It is shown in the above pie chart that most the respondents' menstrual pattern was regular (79%). But it is important to observe that one fifth (21%) of the respondents had irregular menstrual cycle.

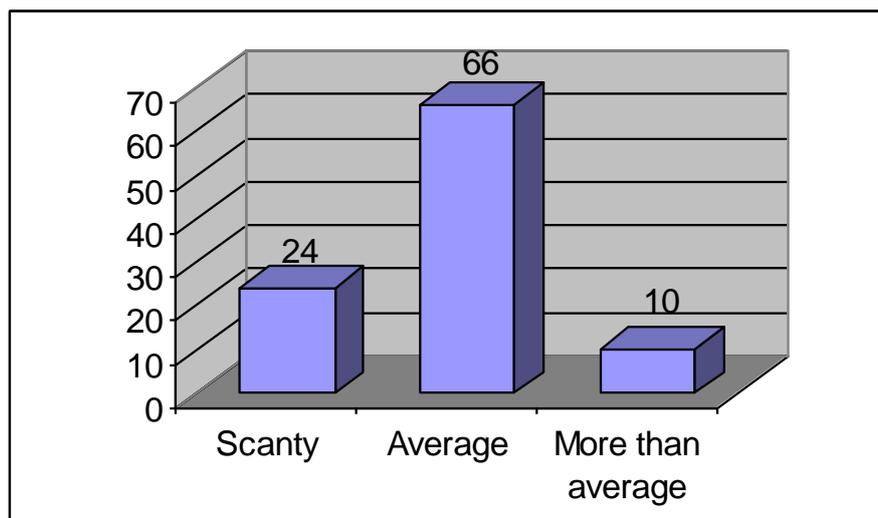


Figure 3: Distribution of the respondents according to the flow of menstrual blood.

Figure 3 shows the flow of menstruation blood in bar diagram. Majority (66%) had average menstrual flow while 24% respondents had scanty flow. Ten percent of the respondents had more than average flow.

Table 4: Mean and range of some menstruation related variables among the respondents (n=100)

Menstruation related variables	Minimum	Maximum	Mean	Std. Deviation
Age at menarche	9	16	12.27	1.163
Average day of menstruation cycle	20	38	28.39	2.835
No of period in last 12 months	8	16	11.59	1.190
Duration of menstruation	2	7	4.43	1.451
Frequency of sanitary pad change per day	1	7	3.23	1.145

Table 4 shows mean and Standard Deviation of some menstruation related variables. The mean age at menarche was 12.27 (\pm SD 1.17) years. Minimum and maximum number days in a menstrual cycle were 20 and 38 respectively; mean was 28.39 (\pm SD 2.83) days. On an

average each respondent menstruates 11.59 times (\pm SD 1.45) in last 12 months and the mean duration of menstruation was 4.43 (\pm SD 1.14) days. On an average each respondents had to change their sanitary pad 3.23 times in each day during menstruation period.

Table 5: Distribution of the respondents by BMI and regularity of menstruation.

Body Mass Index	Regularity of menstruation		χ^2	p-value
	Yes	No		
	n (%)	n (%)		
Normal (<25)	53 (86.9)	8 (13.1)	5.862	<.05
Overweight and Obese (\geq 25)	26 (66.7)	13 (33.3)		

Table 5 shows distribution of the respondents by BMI and regularity of menstruation. It is evident from the table that 86.9% of the respondents whose BMI was

normal menstruate regularly. In overweight and obese respondents this regularity is significantly less (66.7% vs. 86.9%); $\chi^2 = 5.862$ (df=1); $p < .05$.

Table 6: Distribution of the respondents by BMI and flow of menstruation blood.

Flow of menstruation blood	Body Mass Index		χ^2	p-value
	Normal	Overweight and Obese		
	n (%)	n (%)		
Scanty	6 (9.8)	18 (46.2)	19.625	<.001
Average	50 (82.0)	16 (41.0)		
More than average	5 (8.2)	5 (12.8)		

Table 6 shows distribution of the respondents by flow of menstruation blood and BMI. It is shown in the table that 82% of the respondents whose BMI was normal had average menstruation flow. In overweight and obese

respondents this flow was scanty in more than 46% respondents and average in 41% respondents. These differences were statistically highly significant ($\chi^2 = 19.625$ (df=2); $p < .001$).

Table 7: Distribution of the respondents by BMI and regularity of menstruation.

Menstruation	BMI (mean \pm SD)	T test	P-vale
Regular	24.67 \pm 4.96	-3.87	<.001
Irregular	30.03 \pm 7.96		

Table 7 shows distribution of the respondents by BMI and regularity of menstruation. It is shown in the t-test that respondents who had regular menstruation had significantly lower BMI than those who irregular in menstrual pattern ($p < .001$).

DISCUSSION

Menstrual pattern is one of the important women's health issues. It is also an important indicator of underlying reproductive health. Many factors determine the age of menarche including general health, genetic factors, socioeconomic and nutritional status. It is typically between 12 and 13 years; but with the improvements in the nutritional status and general health it has declined in many populations during the last decades.^[13,14] In the present study the age at menarche was 9-16 years with a mean of 12.3 \pm 1.2 which is similar to the other studies.^[15,16] However; these results differed to those from another study that was done in Turkey. The mean menarche age was 13.2 years which was 8 months later than the present one.^[17] This may be related to improvement of nutritional and socioeconomic status of the adolescents in recent decades. Median age at menarche was 12 years which is very much related to findings of study conducted by Grover et al., Singh et al. and Hedge et al.^[18]

Problems with menstrual pattern may affect 75% of girls, and are the major cause of recurrent short-term school absenteeism in female adolescents.^[19,20] Menstrual irregularity and prolonged menstrual bleeding are the most common menstrual disorders in early adolescents.

Prolonged menstrual bleeding usually occurs early after menarche due to anovulatory cycles. In anovulatory cycles, estrogen unopposed by progesterone produces an unstable endometrial lining that eventually breaks down, and vasoconstriction and myocardial contractility do not occur.^[21] In respect of regularity of menstrual cycle, it revealed that it was regular in 79% respondents while Dinajpur Medical College study reported 87.4% to be regular.^[22] No respondents had menstrual cycle over forty days. But in some studies the length found to be more extreme.^[23] Regarding menstrual flow, it was average in 66% respondents, scanty in 24% and heavy in 10% respondents. This is more or less similar to the findings of study conducted by Chowdhury et al.^[24] A substantial numbers of respondents (68%) disclosed that they had dysmenorrhoea with various degree of severity.

Majority of respondents' BMI was within normal limit (61%); but rests (39%) were either overweight or obese. Statistically, this difference was highly significant ($p < .001$). It is found that 86.9% of the respondents whose

BMI was normal menstruate regularly. Other studies also supported this result.^[25,26] In overweight and obese respondents this regularity is significantly less (66.7%, $p < .05$). It is also shown that 82% of the respondents whose BMI was normal had average menstruation flow. In overweight and obese respondents this flow was scanty in more than 46% respondents and average in 41% respondents. These differences were statistically highly significant ($p < .001$).

In the present study parents' educational level was investigated. Forty five percent of the fathers were highly educated and 47% were educated up to higher secondary level. Only 2% were illiterate. Thirty seven percent of the mothers had higher secondary level education and 33% had completed secondary level study. This picture is different from the general situation prevails in Bangladesh because students form higher and middle classes get opportunity to be admitted in medical colleges.

In one study in Iran physical activity was found to be related with irregularity of menstrual pattern. In our study only 17% of respondents had some sorts of exercise habit but majority (83%) didn't do any exercise. Most of the respondents were from affluent families and practice of physical exercise is absent among them. These facts may explain the prevalence of high BMI.

It is well established fact that unhealthy dietary habit attributes heavily for causing obesity in young adults. In our study only 14% usually took low fat high residual diet but 21% had reverse food habit and the rests had mixed food habit. Fatty diet and lack of physical exercise making them overweight or obese which contributing in the development of irregularity of menstruation. Some other studies also support this finding.

CONCLUSION

No significant relationship between menstrual pattern and systolic and diastolic blood pressure of the respondents was observed. No significant relationship between menstrual pattern and Waist/Height ratio of the respondents was found. In overweight and obese respondents this regularity is significantly less. It is shown from the T-test that respondents who had regular menstruation had significantly lower BMI than those who were irregular in menstrual pattern.

REFERENCES

1. Diar A, Laufer MR, Breech LL, Menstruation in girls and adolescents; using the menstrual cycle as a vital sign. *Pediatrics*, 2006; 118(5): 2245-50.

2. Southam, A. L. and Rechart, R.M. The Prognosis for adolescents with menstrual abnormalities. *Am. J. Obstet, Gynecol*, 1960; 94: 637-45.
3. Gardner, J, Adolescent menstrual characteristics as Predictars of gynaecology health *Ann. Hum. Biol*, 1983; 10: 31-40.
4. Apter D, Vihko R. Endocrine determinants of fertility serum Androgen concentration during follow up of adolescent in the third decade of life. *J. Clin, Endocrinal, Metab*, 1990; 71: 970-974.
5. Munjal R Resident, Dr. Deshpande H, Relationship of body fat index and body mass index with menstrual cycle pattern in medical student, 2009; 11(3): 219-2.
6. Van Hooff MH, Voorharst FJ, Kaptein MBM, Hirasig RA, Kappenaal C, Schoemaker J. *Human Reproduction*, 1998; 13(8): 2252-60.
7. Edwards RJW, Goldman MB, Willett W C et al. Adolescent body mass index and fertility caused by ovulatory disorder. *Am. J. Obsteta Gynecol*, 1994; 40: 299-302.
8. Bray GA. Obesity and reproduction. *Hum, Reprod*, 1997; 12(1): 26-32.
9. Munoter K, Schmidt L, Helm P. Length and variation in the menstrual cycle a cross section study from a Danish country, *Br. J, Obstet. Gynaecal*, 1992; 99: 422-9.
10. Fties H, Nillius SN, Petterson F. Epidemiology of secondary amenorrhoea, *Am. J. Obstet, Gynaecol*, 1974; 118: 473-9.
11. Kato, P. Toniolo, K.L. Kaenig et. al. Epidemiologic correlates with menstrual cycle length in middle aged women. *European Journal of Epidemiology*, 2007; 15(9): 809-14.
12. Rowland AS, Baird DD, Long S et. al. Influence of medical conditions and lifestyle factors on the menstrual cycle. *Epidemiology*, 2002; 13(6): 668-74.
13. Chowdhury S, Shahabuddin AK, Seal AJ et al. Nutritional status and age atmenarche in a rural area of Bangladesh. *Ann. Hum. Biol.*, 2000; 27: 249-56
14. Ersoy B, Balkan C, Gunay T, Onag A, Egemen A. Effects of different socioeconomic conditions on menarche in Turkish female students. *Early Hum. Dev.*, 2004; 76: 115-25.
15. Bugum SN et al. evaluation of menstrual pattern in young college girls. *J Bangladesh coll Phys Surg*, 2004; 22: 89- 92.
16. Vicdan K, Kukner S, Dabakoglu T, Ergin T, Keles G, Gokmen O. Demographic and epidemiologic features of female adolescents in Turkey. *J. Adolesc. Health*, 1996; 18: 54-8.
17. Usha R, Krishna and Viniti Salvi. Adolescent and pediatric gynaecological problems. In Ratnam SS, Bhasker Rao K Arulkumaran S. eds. *Obstetrics and Gynaecology for postgraguates. Vol-2. Ist edition. Orient longman Ltd.*, 1994; 293-301.
18. Klein JR, Litt IF. Epidemiology of adolescent dysmenorrhoea. *Pediatrics*, 1981; 68: 661-4.
19. Ziv A, Boulet JR, Slap GB. Utilization of physician offices by adolescents in the United States. *Pediatrics*, 1999; 104: 35-42.
20. Bayer SR, DeCherney AH. Clinical manifestations and treatment of dysfunctional uterine bleeding. *JAMA*, 1993; 269: 1823-8.
21. Chowdhury T.A., Akter S. Survey of dysmenorrhoea in a group of college girls at Dhaka city. *Journal of BCPS*, 1985; 3(1): 12-16.
22. Begum, J., Hossain, A.M., Nazneen, S.A. (2009). Menstrual pattern and common menstrual disorders among students in Dinajpur Medical College Dinajpur. *Med. Col. J.*, 2(2): 37-43.
23. Bullough VL. Age at menarche: A misunderstanding. *Science*, 1981; 213: 365-6.
24. Singh A, Kiran D, Singh H, Nel B, Singh P. Prevalence and severity of dysmenorrhoea: A problem related to menstruation, among first and second year female medical students. *Indian J Physiol Pharmacol*, 2008; 52(4): 389-397.
25. Klein, J.R., Litt, I.F. (1981). Epidemiology of adolescent dysmenorrhoeal. *Pediatrics*, 68: 661-4.
26. Reindollar, R.H., Byrd, J.R., McDonough, P.G. (1981). Delayed sexual development: a study of 252 patients. *Am J. Obstet Gynecol*, 140: 371-380.