



A Cross-Sectional Study on Menstrual Pattern among Adolescent Girls in Aligarh

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ABSTRACT

Background: Adolescents (10-19 years) constitute 21.3% of total population of India. Major biological milestone in this period is the beginning of menstruation. The menstrual cycle are characterized by variability in volume, pattern and regularity. There are few research on menstrual pattern of adolescent girls. Hence this study will highlight the menstrual pattern and factors affecting it.

Methods: A descriptive cross-sectional study in schools under Aligarh Muslim University, Aligarh was undertaken. A total of 422 girls were taken by systematic random sampling with probability proportionate to size. Data was analysed statistically by bivariate analysis and multivariate (binary) logistic model by backward LR method using SPSS Version 20.

Results: 39.1% of girls experienced irregular cycle. Heavy bleeding was reported by 25.6% girls and 18.7% had scanty bleeding. Irregular cycle was 4.25 times in underweight and 2.19 times in overweight/obese compared to normal body mass index. There was 46% reduction in irregular cycle for those who attained menarche for more than 2 years.

Conclusion: There are many host factors which influence menstrual pattern in girls. These factors increases the girls risk for various reproductive disorders in future.

Keywords: menstrual cycle, menstruation, obese, irregular cycle

INTRODUCTION

Adolescents (10-19 years) constitute 21.3% i.e. nearly 1/5th of total population of India.¹ Adolescence is the transitional period between childhood and adulthood when endocrinological, somatic, metabolic and psychological changes occur in the female. Major biological milestone in this period is the beginning of menstruation. Menstruation is a monthly endometrial shedding leading to the discharge of blood from the uterus occurring in every 28 ± 7 day.^{2,3} The average menstrual bleeding lasts about 5 days, which sums up to females having approximately 67 months of menstruation throughout her reproductive age.⁴ Menstruation, and the menstrual cycle are characterized by variability in volume, pattern and regularity. It acts as a significant tool in the monitoring of normal de-

velopment as well as diagnosis of pathological conditions in adolescent girls.

Since there is paucity of documented research on menstrual pattern of adolescent girls in and around Aligarh, this study will highlight the menstrual pattern and factors affecting it. The present study can also act as a guide in framing health policy of adolescent girls.

OBJECTIVES

The research was undertaken to study the menstrual pattern among adolescent girls and also to find out the factors affecting the menstrual pattern in study group.

MATERIAL & METHODS

The present study was a Community based Cross-Sectional study conducted in Secondary and higher Secondary Schools (Girls) of Aligarh Muslim University, Aligarh for a period of one year i.e. July 2015 to June 2016. The study was conducted among the students of class 6th to 12th standard from each of the university girl schools namely Senior Secondary School Girls, AMU Girls High School and AMU ABK High School (Girls) using systematic random sampling with population proportionate to size. It was decided to take 422 students from selected schools of AMU. For the selection of 422 students from different schools, the Population proportionate to size technique was used to calculate the required sample from each class. Out of total of 422, 97 girls were taken from Senior Secondary school girls, 200 from AMU Girls High school and 125 from AMU ABK High school Girls.

Inclusion criteria: All students studying in class 6th to 12th standard from the selected schools and had attained menarche and who gave consent were included in the study.

Exclusion Criteria: Students who did not give consent to participate in the study and who were absent on the day of data collection.

Sampling design: After obtaining respective sample sizes to be drawn from each of the selected schools and classes by probability proportion to size (PPS), Systematic random sampling was used to draw the desired samples from each class.

Sample size was calculated using Formula $n = \frac{3.84pq}{l^2}$ where p is Anticipated Prevalence which was 50% since there was a paucity of studies conducted at Aligarh, the anticipated prevalence was taken as 50% for maximum sample size. (Lwanga and Lemeshaw, 1991).⁵ 'l' is allowable error which was kept at 5% The calculated sample size was 384. Considering non-response rate of 10% the final sample size was 422. It was decided to take 422 students from selected schools of AMU.

Study instruments: The study instruments used in this research were as following:

Data regarding the socio-demographic characteristics of the students and age of menarche was obtained. Socioeconomic class was assessed by Modified BG Prasad Classification, May 2016.²⁵

Height was recorded with buttocks and back of their head in contact with smooth vertical wall looking straight forward. While for weight measurement it was instructed to stand on both feet in the centre of weighing machine. Weight and height was used to calculate Body mass index (BMI) using formula $BMI = \frac{\text{weight in Kg}}{\text{height in m}^2}$. BMI was classified into four groups based on the cut off

points recommended by World Health Organization.⁶

Pattern of menstruation was assessed by length of menstrual cycle and duration of menstruation. Cycle with an average rhythm of 28 ± 7 days and 3-6 days of bleeding is a regular menstruation.⁷

Pictorial blood assessment chart was used to assess heavy menstrual bleeding. It is a semi objective way of quantifying amount of blood loss per menstrual cycle by recording number and saturation of sanitary pads. Students were asked to count the number of sanitary pads used during menstruation and the total score was calculated by adding up the individual score. Score more than 100 indicates menorrhagia or heavy bleeding.⁸

Data Analysis:

Data entry and analysis was done using SPSS Software Version 20. The univariate analyses (proportions, percentages, and ratios) had been displayed. Firstly, a bivariate analysis was done to ascertain the association between menstrual pattern with variables. Only those found to be significant were entered into a multivariate (Binary) logistic model by BACKWARD LR method. The adjusted odds with 95% confidence interval had been computed. A p value < 0.05 was considered as statistically significant.

Ethical considerations:

The study protocol was approved by Institutional Ethics Committee, JNMCH, AMU, Aligarh. Written informed consent from the participating schools was obtained. An informed oral assent was taken from all the participants, after explaining the purpose of the study and prior consent from parents was taken. Confidentiality was maintained throughout the study. Health education and adequate counselling was provided to all the individuals who participated.

RESULTS

The present study was conducted in schools which are under Aligarh Muslim University. A total of 422 girls participated in study and gave a response rate of 100%. Table 1 shows the socio-demographic details of study subjects. Majority of the respondents, (50.2%), were aged between 10-14 years, while remaining in the age range of 15-19 years (49.8%). A large group of respondents were in 9th-10th standard (39.1%) while 36% in 6th-8th and 24.9% in 11th-12th standard respectively. Most of the respondents were following Islam (82.7%) by religion, rest were Hindu (17.3%). Almost equal number of respondents was in socioeconomic class 1

Table 1: Sociodemographic profile of Study Population (N= 422)

| Characteristics | Participants (%) |
|------------------------------------|------------------|
| Age (years) | |
| Oct-14 | 202 (47.9) |
| 15-19 | 220 (52.1) |
| Education Status | |
| 6 th - 8 th | 152 (36) |
| 9 th -10 th | 165 (39.1) |
| 11 th -12 th | 105 (24.9) |
| Religion | |
| Islam | 349 (82.7) |
| Hinduism | 73 (17.3) |
| Family size | |
| Less than 5 | 201 (47.6) |
| 05-Oct | 154 (36.5) |
| More than 10 | 67 (15.9) |
| Socioeconomic Class | |
| Class 1 | 152 (36) |
| Class 2 | 153 (36.3) |
| Class 3 | 53 (12.6) |
| Class 4 | 46 (10.9) |
| Class 5 | 18 (4.3) |
| Body Mass index | |
| Normal | 180 (42.7) |
| Underweight | 79 (18.7) |
| Overweight/obese | 163 (38.6) |

Table 2: Menstrual Pattern of Study Population (N=422)

| Menstrual Pattern | Participants (%) |
|---------------------------------|------------------|
| Cycle Length | |
| Less than 21 | 64 (15.2) |
| 21-35 | 284 (67.3) |
| More than 35 | 74 (17.5) |
| Duration of Menstruation | |
| Less than 3 | 31 (7.3) |
| 03-May | 282 (66.8) |
| More than 5 | 109 (25.8) |
| Regularity | |
| Regular | 257 (60.9) |
| Irregular | 165 (39.1) |

and 2, 36% and 36.3% respectively while only 4.3% respondents were in class 5 according to modified BG Prasad classification (2016). Majority of study participants were in the normal BMI range (42.7%) while a large proportion i.e. 163 (38.6) were overweight and obese as per WHO Classification.

As shown in figure 1 nearly 51.7% of girls were having menstruation for more than 2 years.

The menstrual pattern of participants is shown in (Table 2) with respect to cycle length, duration of menstruation and regularity. Out of the total study population, 64(15.2%) girls had a menstrual cycle length shorter than 21 days, 74(17.5%) had cycle longer than 35 days and 284(67.3%) had a cycle length between 21 and 35 days. Majority 282(66.8%) of the subjects experienced normal duration of bleeding (3-5 days), 31(7.3%) reported

shorter duration of bleeding (<3 days) and 109(25.8%) had longer duration of bleeding (>5 days). It was observed that majority 257(60.9%) experienced regular cycle while 165(39.1%) reported irregular cycle.

As shown in figure 2, majority 235(55.7%) of the respondents experienced normal bleeding whereas 108(25.6%) had heavy bleeding and 79(18.7%) reported scanty bleeding.

The regularity of menstruation is shown in (Table 3) with respect to age, education status, religion, socioeconomic class, body mass index, cycle length, duration of menstruation, amount of bleeding & duration since menarche. There was a statistical significant difference between menstrual cycle regularity and age group (p=0.04), education status (p=0.02), Body mass index, cycle length, duration of menstruation, amount of bleeding and duration since menarche (p < 0.001). But, no statistically significant value of the regularity of menstrual cycle was found by religion and socioeconomic class.

After bivariate analysis, the significant predictors of regular menstruation were entered into multivariate analysis. Those explanatory variables which are significant on multivariate analysis are displayed in table 4. It revealed that odds of irregular cycle is 4.25 times in underweight and 2.19 times in overweight/obese as compared to those with normal body mass index. Respondents with a shorter cycle length i.e. less than 21 days were 2.65 times more likely to have irregular menstruation compared to those who had cycle length between 21-35 days. Duration of menstrual bleeding had a positive impact on irregular menstruation. It was reported that participants with duration of menstruation for less than 3 days were 2.65 times more likely to have irregular menstrual cycle compared to those whose duration of menstruation was 3-5 days whereas odds of having irregular menstruation was 2.54 times among those with menstrual bleeding for more 5 days. The likelihood of irregular menstrual cycle was 3.44 times higher in respondents with heavy menstrual bleeding compared to normal menstrual bleeding. Respondents who had attained menarche for more than two years showed 46% reduction in irregular cycle compared to those who attained menarche within two years.

DISCUSSION

This study was conducted to find out menstrual pattern and factors affecting in adolescent population. There are variations reported in the population for cycle length, duration of menstruation, both intra individual and inter individual varia

Table 3: Factors affecting regularity of menstruation in adolescent girls

| Variables | Menstrual Cycle | | p value |
|--|-----------------|-----------|---------|
| | Irregular* | Regular* | |
| Age Group | | | |
| 10-14 | 89(53.9) | 113(44.0) | 0.04 |
| 15-19 | 76(46.1) | 144(56.0) | |
| Education status | | | |
| 6 th – 8 th | 66(40.0) | 86(33.5) | 0.02 |
| 9 th – 10 th | 70(42.4) | 95(37.0) | |
| 11 th – 12 th | 29(17.6) | 76(29.6) | |
| Religion | | | |
| Islam | 140(84.8) | 209(81.3) | 0.350 |
| Hinduism | 25(15.2) | 48(18.7) | |
| Body mass index | | | |
| Normal | 44(26.7) | 136(52.9) | <0.001 |
| Underweight | 28(17.0) | 51(19.8) | |
| Overweight/Obese | 93(56.4) | 70(27.2) | |
| Socioeconomic Class ²⁵ | | | |
| Class 1 | 60(36.4) | 92(35.8) | 0.992 |
| Class 2 | 60(36.4) | 93(36.2) | |
| Class 3 | 21(12.7) | 32(12.5) | |
| Class 4 | 18(10.9) | 28(10.9) | |
| Class 5 | 06(3.6) | 12(4.7) | |
| Cycle length (days) | | | |
| 21-35 | 78(47.3) | 206(80.2) | <0.001 |
| Less than 21 | 41(24.8) | 23(8.9) | |
| More than 35 | 46(27.9) | 28(10.9) | |
| Duration of menstruation (days) | | | |
| 3-5 | 92(55.8) | 190(73.9) | <0.001 |
| Less than 3 | 11(6.7) | 20(7.8) | |
| More than 5 | 62(37.6) | 47(18.3) | |
| Duration since menarche(years) | | | |
| Upto 2 | 106(64.2) | 98(38.1) | <0.001 |
| More than 2 | 59(35.8) | 159(61.9) | |
| Amount of bleeding | | | |
| Normal | 81(49.1) | 154(59.9) | <0.001 |
| Scanty | 24(14.5) | 55(21.4) | |
| Heavy | 60(36.4) | 48(18.7) | |

*% expressed in parenthesis were calculated from column total.

Table 4: Factors affecting Regularity of menstruation (Multivariate Analysis)

| Explanatory Variable | aOR (95% CI) | p value |
|---------------------------------------|--------------------|---------|
| Body mass index | | |
| Normal | 1.00 | <0.001 |
| Underweight | 4.25 (2.50 - 7.24) | |
| Overweight/obese | 2.19 (1.18 - 4.09) | |
| Duration since menarche(years) | | |
| Upto 2 | 1.00 | 0.01 |
| More than 2 | 0.54 (0.33 - 0.90) | |
| Cycle length(days) | | |
| 21-35 | 1.00 | <0.01 |
| Less than 21 | 2.65 (1.42 - 4.96) | |
| More than 35 | 1.16 (0.52 - 2.58) | |
| Duration of menstruation(days) | | |
| 3-5 | 1.00 | <0.01 |
| Less than 3 | 2.65 (1.47 - 4.76) | |
| More than 5 | 2.54 (0.99 - 6.54) | |
| Amount of bleeding | | |
| Normal | 1.00 | <0.01 |
| Scanty | 1.80 (1.01 - 3.18) | |
| Heavy | 3.44 (1.68 - 7.05) | |

aOR=Adjusted Odds Ratio

The present study has highlighted a menstrual pattern of 21-35 days cycle length by 67.3% of study population and 3-5 days of menstruation by 66.8% of the respondents which is considered as normal. Abnormal menstrual pattern in adolescent girls may be due to anovulatory cycles leading to variable amount of blood loss. A similar study in Maharashtra by Holambe et al reported most of the girls, 144(57.14%), had inter-menstrual interval of 25-31 days and 5 days as the median duration of bleeding. ⁹ Jogdand et al reported that in 66.54% girls, menstrual cycle was of 28-32 days. 76.65% girls have reported blood flow for 3-5 days. ¹⁰ Zegeye et al in Ethiopia reported out of the total study population, 117(20.7%) adolescents had a menstrual cycle length shorter than 21 days, 51(9%) longer than 35 days and 70% had a cycle length between 21 and 35 days. ¹¹ About 39% of the girls had irregular menstruation in this study. Similar finding is also observed from Karad, Maharashtra and slum area in Delhi as 36% and 31.8% respectively with irregular menstrual cycle.^{12,13} Out of total 422 girls, 25.6% reported heavy bleeding and 18.7% had scanty bleeding. This present finding is consistent with a study in Jammu by Dhingra et al which reported heavy bleeding in 26.7% of the study population. ¹⁴ Those girls who suffered heavy bleeding could be attributed to anaemic conditions and needs further investigation.

Irregular menstrual cycle was significantly associated with cycle length and duration of menstruation on bivariate analysis in this study. Similar finding was supported by a study in Mysore city reporting significant association between cycle length and frequency of irregularity. Irregular menstrual cycles were frequent among girls who had cycle length >35 days. Females with longer duration of flow experienced irregular menstrual pattern and statistically significant.¹⁵ De sanctis et al found that long lasting bleeding periods (>6 days) was significantly and positively associated with irregular cycle (OR = 2.59; 95%CI: 1.95-3.44). Occasional irregularity in menstrual cycle may be due to an immature hypothalamo-pituitary-ovarian axis and this is common in first 2 to 3 years after menarche.¹⁶ It is observed in present study that duration since menarche is significantly associated with irregular menstrual cycle. Those who had attained menarche for more than two years showed 46% reduction in irregular cycle compared to those who attained menarche within two years. The abnormal cycle length within two years of achieving menarche is attributed to anovulation. However, other pathological causes of anovulation needed to be ruled out such as polycystic ovarian disorder. Lee et al reported menstrual disorders were significantly more common in female adolescents within two years of men-

arce compared to those with more than two years.¹⁷ Odds of irregular cycle is 3.4 times higher in those adolescent girls with heavy menstrual bleeding. Initial anovulatory cycles can be associated with heavy menstrual bleeding^[18] because estrogens, as opposed by progesterone, induce an unstable endometrial lining, the breakdown of which causes major uterine bleedings.¹⁸ **Mohite et al** reported a significant association was found between pattern of menstrual cycle & amount of bleeding flow.¹⁹

Regarding BMI, near about one third of adolescents are in the overweight/obese category in this study. Adolescent girls have a greater influence on obesity due to hormonal changes at puberty and development of secondary sexual characteristics which results accumulation and redistribution of fat. The literature suggests that risk of long or irregular cycles increases at both extremes of the weight distribution.²⁰⁻²³ **Rowland et al** in a study in north Carolina demonstrated dose-response relation between BMI and odds of irregular cycles.²⁴

CONCLUSION

Finally concluding this study with distribution of menstrual pattern and factors affecting it amongst adolescent girls. The prevalence of irregular menstruation is higher in first two years since menarche. The irregularity in menses becomes higher at both extremes of body mass index i.e. underweight and overweight/obese. One fourth girls are suffering from heavy bleeding which makes them more susceptible to iron deficiency anaemia. Menstrual abnormalities needs to be investigated by clinicians to minimize possible consequences and sequelae. Adolescent girls should be encouraged for regular charting of menstrual frequency since menarche. The school administration should run regular health education and awareness programmes for a healthy reproductive life.

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