Menstrual pattern among school girls with special reference to determinants of amount of menstrual blood loss: A cross-sectional study in Jaipur city

Dr. Sudha Saluja[1], Dr. Pushpa Nagar[2], Dr. Rajender Verma[3], Dr. Rajeev Yadav[4§],
Dr. Nidhi Goyal[5], Dr. Mukesh Swami[6], Dr. Prachi Gupta[7]

[1]Assistant Professor, Department of Gynecology and Obstetrics, SMS Medical College Jaipur (Rajasthan) India
[2]Senior Professor, Department of Gynecology and Obstetrics, SMS Medical College Jaipur (Rajasthan) India
[3]Medical Officer, Department of Gynecology and Obstetrics, SMS Medical College Jaipur (Rajasthan) India
[4]Associate Professor, Department of Community Medicine, SMS Medical College Jaipur (Rajasthan) India
[5-7]PG Students, Department of Gynecology and Obstetrics, SMS Medical College Jaipur (Rajasthan) India
[§]Corresponding author's Email: drrajeevyadav@gmail.com

Abstract— Menstruation had many tremendous psychological response in adolescent. And there are many myths prevalent regarding menstruation. So this study was conducted with the aim to study menstrual pattern in adolescent school going girls and association of menstrual blood flow with their BMI, diet, sports activities and gadgets. This study is a descriptive type of cross-sectional study in which adolescent girls who attained menarche were included. Present study was carried out on in government schools Jaipur City (Rajasthan) on 1233 girls aged between 13 to 19 years. BMI was significantly associated with amount of blood loss. Girls whose BMI was <18.5 kg/m2 or underweight had moderate to severe degree of dysmenorrhoea compare to those BMI 18.5-24.9 kg/m2. Proportion of girls involved in sports activities were having less amount of blood loss compared to those who were leading sedentary life. B So it can be concluded that BMI has direct co-relation with menstrual blood loss; the girls involved in sports had less amount of menstrual blood loss.

Keywords: Menstrual Pattern, Menstrual Blood Loss, Adolescence, BMI, Sports Activities.

I.   INTRODUCTION

Adolescence is a crucial periods of transition from childhood to adulthood. Maximum amount of physical, psychological and behavioural changes takes place in these years. For girls, it is the periods of extreme stress and strain.[1]

Adolescence is the period of life beginning with the appearance of secondary sexual characters and terminated with cessation of somatic growth[2]. The five important physical changes are evident during puberty i.e. beginning of growth spurt, breast budding (thelarche), pubic and axillary hair growth (adrenarche), peak growth in height and onset of menses (menarche).[3,4] Ovaries enlarge and primordial follicles start growing into graffian follicles under hypothalamic and gonadotropin stimulus. Graffian follicles mature and oestrogen is secreted by granulosa cells. Oestrogen receptors are formed in target tissues and this hormone brings changes in breasts and genital organs. Menstruation and final growth spurt occurs only after secondary sexual characters are fully developed in most cases.

Menarche and menstruation are bound to elicit tremendous psychological response in them. Obesity, malnutrition, emotional stress and sedentary life affect menstrual regularity, blood flow, interval between menstruation and pain during menstruation adversely[5].

Therefore this present study is aimed to study the pattern of menstruation & determinants of amount of blood loss during menstruation.

II. Methodology

This cros-sectional descriptive type of observational study was conducted on 1233 school going adolescent girls in the department of Obstetrics & Gynecology, SMS Medical College, Jaipur (Rajasthan) India. Subjects for study were selected from adolescent girls attending government schools of Jaipur city.

2.1 Sample size

Minimum 1068 adolescent girls were required as sample size for present study at 95% confidence level and absolute allowable error of 3% assuming abnormal menstrual pattern in 50% of adolescent girls.

2.2 Sampling technique

A complete list of middle, secondary and senior secondary government school was procured from DEO. Schools were selected from the list by Simple Random Sampling till desired sample size was attained. Permission from selected school authorities was also taken from relevant authorities prior to the study. If permission couldn't obtain from any school due to any reason, it was replaced by another randomly selected school from the list.

For the study purpose, adolescent girls of selected schools present on the day of survey, aged up to 19 years who had attained menarche were included in this study. Girls who diagnosed medical illnesses known to affect menstruation pattern- diabetes mellitus, hypothyroidism, coagulation disorder, adrenal disease were excluded from this study. Girls who were on treatment with drugs known to affect menstruation pattern and who were not mentally sound o give answers were also excluded from this study. Finally 1233 eligible girls randomly selected from government school were included in this study.

These selected girls were interrogated, examined and investigated to study the pattern of menstruation & various determinants of amount of blood loss during menstruation. Operational criteria used in this study were as follows:-

2.3 Menstrual flow

Accepted as per International Federation of gynecology and Obstetrics system for abnormal uterine bleeding was used which is as follows:-

Light	<20 ml
Normal	20-80ml
Heavy	>80ml

2.4 Body Mass Index (BMI)

Accepted as per Adapted from WHO,1995;WHO,2000 and WHO, 2004

Table
Classification According to Body Mass Index (BMI)

Classification	BMI(kg/m^2) Principal Cut-Off Points
Underweight	<18.50
Normal Range	18.50-24.99
Overweight	≥25.00
Obese	≥30.00

2.5   **Frequency of Junk food:**

Frequent: ≥3days a week
Occasional: <3days a week

2.6   **Adequate sports activities:**

Yes: >2hours/day for at least≥ 4days/week
No:<2 hours and/or<4days/week

2.7   **Excessive use of gadgets:**

Yes:>4 hours/day
No:<4hours/day

2.8   **Statistical Analysis**

Continuous variables were summarized as means and SD and were analyzed by using ANOVA test. Nominal /categorical variables were expressed as proportions and were analyzed using Chi Square Test. P value <0.05 was taken as significant and Medcalc 16.4 version software was used for statistical calculation.

III.   RESULT

Present study was carried out on 1233 eligible adolescent girls of government schools of Jaipur city under department of Gynecology and Obstetrics, SMS Medical College, Jaipur, Rajasthan.

Maximum eligible adolescent girls were in age group of 15-17 years followed by 13-15 years and 17-19 years. Mean age of adolescent girls was 15.88±1.37 years with the range of 13 to 19 years. (Figure 1)

Mean BMI of eligible adolescent girls was 19.31±3.56 kg/m^2 with the range of 13 to 38 kg/m^2. Out of total, 47.60% participants were underweight, 45.17% were normal weight and 1.63% was obese. (Figure 2)
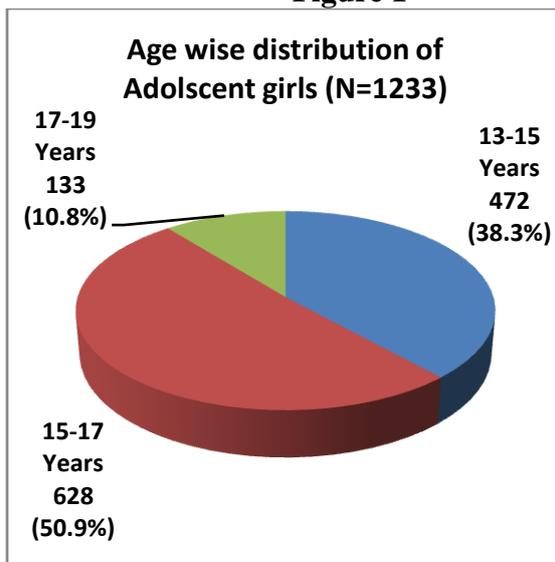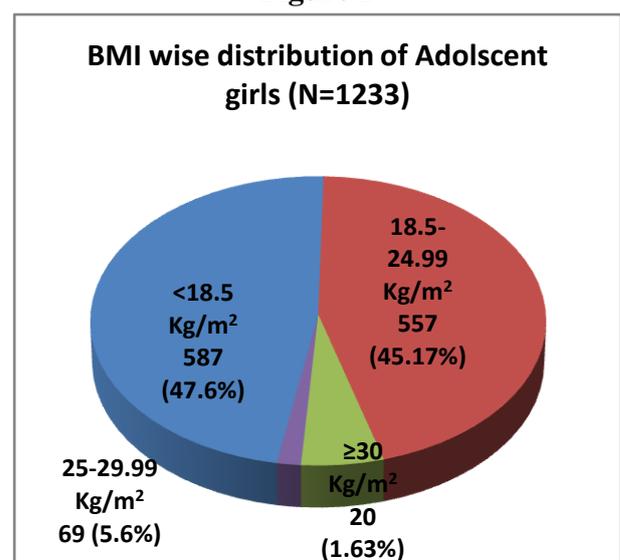

Figure 1

Age wise distribution of Adolscent girls (N=1233)

17-19 Years 133 (10.8%)   13-15 Years 472 (38.3%)   15-17 Years 628 (50.9%)

Figure 2

BMI wise distribution of Adolscent girls (N=1233)

<18.5 Kg/m^2 587 (47.6%)   18.5-24.99 Kg/m^2 557 (45.17%)   ≥30 Kg/m^2 20 (1.63%)   25-29.99 Kg/m^2 69 (5.6%)

Mean age at menarche was 13.35±0.988 years with the range of 11to17 years in which most of the girls (88.86%) attained menarche at 13 to 14 years and only 0.16 % girls had menarche at 17 years of age. (Table 1)

Mean duration of menstrual flow in present study was 4.82±13days and 74.39% participants had duration of menstrual flow between 2-5days.(Table 1)

In present study, 74.13% adolescent girls had normal amount of menstrual blood loss whereas 13.22% had scanty amount of blood loss and 12.65% had excessive bleeding. (Table 1)

Out of total 1233 girls, 1173(95.13%) of the adolescent girls were menstruating at the interval of 21 to 35 days. Only 4.87% girls had menstrual cycle more than 35 days. None had menstrual cycle less than 21 days. Mean intermenstrual period was 29.64±3.94 days. (Table 1)

In this study 56.93% (914) girls out of total 1233 had moderate degree of pain and they had to use oral analgesic to do their routine work. 29.03% (358) of girls had severe degree of pain and were unable to do their routine work. Only 14.03% (173) of girls had mild degree of pain. (Table 1).

Table 1
Menstruation pattern of adolescent girls (N=1233)

Variables of Menstruation pattern		Number	Percentage
Age of menarche (years)	11	8	1.46
	12	216	17.52
	13	489	39.66
	14	360	29.20
	15	132	10.71
	16	16	1.3O
	17	2	0.16
Duration of menstrual flow (Days)	2	4	0.32
	3	173	14.03
	4	400	32.44
	5	328	26.60
	6	145	11.76
	7	159	12.90
	8	24	1.95
Amount of blood flow	Light	163	13.22
	Normal	914	74.13
	Heavy	156	12.65
Interval between two cycle (Days)	21-35	1173	95.13
	>35	60	4.87
Severity of dysmenorrhea	Mild	173	14.03
	Moderate	702	56.93
	Severe	358	29.03

No significant association was observed between the age at menarche and amount of menstrual blood loss in present study.(Table 2)

Table 2
Association of age at menarche and amount of menstrual blood loss

Amount of blood loss	N	Mean	Std. dev.	P-value*
Light	163	13.29	0.942	
Normal	914	13.35	0.992	
Heavy	156	13.41	1.015	0.577
Total	1233	13.35	0.988	

One way ANOVA test

But significant association was observed between the BMI and amount of menstrual blood loss in present study. Blood loss was observed more as the weight increases although it was found significant mean amount of blood loss in light weight women was compared with normal and heavy weight women. (Table 3)

Table 3
Association of BMI and amount of menstrual blood loss

Amount of blood loss	Number	Mean	Std. dev.	P-value*	Significant groups#
Light	163	18.41	2.537		3 Vs 1
Normal	914	19.38	3.618	<0.001, Sig	2 Vs 1
Heavy	156	19.90	4.447		
Total	1233	19.32	3.3632		

One way ANOVA test #tukey's HS

In this study, no significant association was observed according to intake of junk food with the amount of menstrual blood flow. (Table 4)

Table 4
Association of junk food with amount of menstrual blood loss

Amount of blood loss	Intake of junk food				Total	
	Occasional		Frequent			
	No.	%	No.	%	No.	%
Light	53	32.50	110	67.48	163	100
Normal	262	28.67	652	71.33	914	100
Heavy	50	32.05	106	67.95	156	100
Total	365	29.60	868	70.40	1233	100

Chi-square test = 1.498 at 2 DF   P Value= 0.473   LS=NS

A significant association was observed between the menstrual pattern and sports activity in this study. Girls involved in sports activity were having less amount of menstrual blood loss as compared to those who were leading sedentary life. But no significant association was observed in this study between uses of gadgets with the menstrual blood flow but gadgets lead to sedentary life which in turn causes disturbed menstrual flow. (Table 5)

Table 5
Association of sports activity and use of gadgets with amount of menstrual blood loss

Amount of blood loss	Sports Activity				Total	
	Yes		No			
	No.	%	No.	%	No.	%
Light	108	66.26	55	33.74	163	100
Normal	581	63.57	333	36.43	914	100
Heavy	89	50.64	77	49.36	156	100
Total	768	62.29	465	37.71	1233	100
	Chi-square test = 10.738 at 2 DF P Value= 0.005 LS=S					
	Gadgets Use				Total	
	Yes		No			
	No.	%	No.	%	No.	%
Light	150	92.02	13	7.98	163	100
Normal	854	93.44	60	6.5	914	100
Heavy	140	89.74	16	10.26	150	100
Total	1144	92.78	89	7.22	1233	100
	Chi-square test = 2.873 at 2 DF P Value= 0.238 LS=NS					

IV.   DISCUSSION

Present study was carried out in the government schools of Jaipur city, Rajasthan, in which 1233 girls aged between 13 to 19 years of age were included.

Age of adolescent girls was 15.88±1.37years with the range of 13 to 19 years and BMI was 19.31 ±3.56 kg/m^2 with the range of 13 to 38 kg/m^2. 47.60% participants were underweight, 45.17% were normal weight and 1.63% was obese. Age of menarche was 13.35±0.988 years with the range of 11to17 years in which most of the girls (88.86%) attained menarche at 13 to 14 years and only 0.16 % girls had menarche at 17 years of age, however, in the study of Supriya Kumari et al[6], majority girls attained menarche at 12-13 years.[6]

Duration of menstrual flow in present study was found 4.82±13days and 74.39% participants had duration of menstrual flow between 2-5days. Similar results were obtained in the study of Gumanga et al[7] in which mean duration of menstrual flow was 4-9 days and 71% had menses lasting for 2-5 days while 27.2% had menses lasting over 5 days[7].

74.13% adolescent girls in this study had normal amount of menstrual blood loss where 13.22% had scanty amount of blood loss and 12.65% had excessive bleeding. This finding is little bit dissimilar with the Rajnish Mohiti et al[8] where only 37.7% girls had normal bleeding while scanty and heavy bleeding was seen in 57% and 5.6% girls respectively. This might be because of fact that present study was conducted among school going girls while Rajnish et al[8] conducted study among college going girls. Moreover, the criteria for quantifying blood loss may be different in both the studies.[8]

In present study 95.13% of the adolescent girls were menstruating at the interval of 21 to 35 days. Only 4.87% girls had menstrual cycle more than 35 days. None had menstrual cycle less than 21 days. Inter-menstrual period was 29.64±3.94 days. Similar results were observed in the study of Rigon F et al[9] who reported that out of total 4892 girls, majority had inter-menstrual period between 21 to35 days; 3.4% girls had more than 35 days of intermenstrual period and only3% girls had an inter-menstrual period less than 21 days.[9]

In this study 56.93% girls had moderate degree of pain and they had to use oral analgesic to do their routine work. 29.03% of girls had severe degree of pain and were unable to do their routine work. Only 14.03% of girls had mild degree of pain. Similarly severe degree of pain was found in 30% of participants in the study conducted by Nirmala et al[10].

No significant association was observed between the age of menarche and amount of menstrual blood loss in present study. But significant association was observed between BMI and amount of blood loss during menses. Blood loss increases with increase of weight in this study. Andrew S Rowland et al[11] also reported that excessive (heavy) and irregular cycle were more common in girls with increasing body mass index[11].

In this study, no significant association was observed according to intake of junk food with the amount of menstrual blood flow. However, Purushhottam Prmanik et al[12] found in his study that 19.23% of adolescent girls who take fast food every day in a week show longer duration of menstrual flow in compare to 6.20% of girls those take fast food at frequency of 1 and 2 days per week. Rupa Vani K et al[13] showed in her study that passage of clots was significantly high in the girls who were dieting. Goel S et al[14] found that adolescent girls who were consuming excess of energy, protein, and fat and inadequate micronutrient have menstrual irregularities.

V.   CONCLUSION

In this study mean age at menarche was 13.35±0.988 years with the range of 11to17 years. Mean duration of menstrual flow was found 4.82±13 days and 74.39% participants had duration of menstrual flow between 2-5days. And 74.13% adolescent girls had normal amount of menstrual blood loss whereas 13.22% had scanty amount of blood loss and 12.65% had excessive bleeding. 95.13% of the adolescent girls were menstruating at the interval of 21 to 35 days. Only 4.87% girls had menstrual cycle more than 35 days. None had menstrual cycle less than 21 days. Mean intermenstrual period was 29.64±3.94 days. In this study 56.93% girls had moderate degree of pain and they had to use oral analgesic to do their routine work. 29.03% of girls had severe degree of pain and were unable to do their routine work. Only 14.03% of girls had mild degree of pain

On analysis regarding association it can be concluded that BMI has direct co-relation with menstrual blood loss; the girls involved in sports had less amount of menstrual blood loss.

CONFLICT OF INTEREST

None declared till now.

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