

Variation in the menstrual characteristics in adolescents of West Bengal

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ABSTRACT

Introduction: Like other biological phenomena, menstrual characteristics also vary with different age groups, socioeconomic status, and lifestyles. This study aimed to find out the variation in the menstrual characteristics among adolescents of different age groups, and the significant predictors of a menstrual outcome.

Methods: 260 adolescent Bengali-speaking Hindu girls of three different age groups (early, middle and late adolescence) were selected from the district of 24 Parganas (North), West Bengal, India. Data on the socioeconomic conditions and menstrual characteristics were collected via of a pre-tested questionnaire.

Results: Significant differences exist between these three age groups in characteristics such as irregularity in the cycle, skipping of the cycle, duration of menstrual discharge, absenteeism from school because of pain and discomfort related to menstruation, and the prevalence of white discharge. Logistic regression showed that socioeconomic variables such as the occupations of the parents and educational levels of the parents and the subjects have a significant relationship with some menstrual outcomes (irregularity in the menstrual cycle, premenstrual problems, and duration of menstrual discharge) and with consultation of doctors due to some morbid conditions. Some of the other menstrual characteristics such as duration of menstrual discharge, number of days of peak discharge and absence of pain at the time of menstrual discharge, can be significantly predicted by age group of the individuals and other menstrual features.

Conclusion: Menstrual characteristics vary among the adolescents of different age groups, and some of the menstrual characteristics can be predicted by some socioeconomic factors and other menstrual variables.

Keywords: female adolescents, menstrual characteristics, menstruation

INTRODUCTION

The menstrual cycle is a very important indicator of women's reproductive health and of their endocrine function.^(1,2) The characteristic features of the menstrual cycle vary across different age groups, between married and unmarried individuals, with the place of residence, with differential life styles and among different socioeconomic groups.⁽³⁻⁸⁾ Some of these menstrual characteristics, such as irregularity in the menstrual cycle, premenstrual pain and discomfort, pain and discomfort at the time of menstrual discharge and a heavy menstrual discharge, may affect the general and/or reproductive health of a woman,^(1,9,10) and also her productivity.^(7,8,11-15) A number of studies from different parts of the world, including India, show that a large proportion of women (both young and adult) experience these problems which remain mostly unattended by medical experts.^(2,7,8,16-25) According to Thomas and Ellertson, "there can be no other disease or condition that affects so many people on such a regular basis with consequences, at both individual and societal level, which is not prioritised in some way by health professionals or policy makers".⁽²⁶⁾

It has also been shown that the duration of the menstrual discharge is either extremely long or extremely short after menarche and before menopause, and a woman generally experiences peak discharge on the second day of her period.^(27,28) Some studies show that there exists a regional variation in the duration of menstrual discharge; in India, this variation also exists between contrasting caste and socioeconomic groups,^(8,28,29) but not with the place of residence.⁽⁷⁾ Few studies have also attempted to estimate the amount of discharge either by subjective assessment made by the women themselves,^(7,25,27) or by some other objective measures.^(24,30) Hygienic practices related to menstruation, like prolonged use of these absorbents (either a piece of cloth or a commercial product) at a stretch, inappropriate laundering of the cloth absorbent and improper perineum care, create an environment for harbouring harmful microorganisms that may affect the urinary tract and also infect the perineum, which in turn can affect the reproductive health of woman.^(31,32) Some of the studies from India show that, generally, the urban poor and the rural people use a piece of old cloth as an absorbent at the time of menstrual discharge,^(7,8,22,32-34)

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Table I. Comparison of menstrual characteristics in the different age categories.

	Age category, no. (%)			χ^2 (p-value)
	I	II	III	
Regularity in the menstrual cycle				
Regular	4 (3.70)	7 (6.25)	11 (18.33)	12.069 (< 0.002)
Irregular	104 (96.30)	105 (93.75)	49 (81.67)	
Skipping of menstrual cycle				
Skipped	32 (29.63)	17 (15.18)	12 (20.0)	6.881 (< 0.032)*
Not skipped	76 (70.37)	95 (84.82)	48 (80.0)	
Premenstrual problems				
Present	60 (55.56)	71 (63.69)	36 (60.0)	1.407 (> 0.495)
Absent	48 (44.44)	41 (36.61)	24 (40.0)	
Premenstrual back and/or abdominal pain				
Present	56 (51.85)	53 (47.32)	34 (56.67)	1.408 (> 0.495)
Absent	52 (48.15)	59 (52.68)	26 (43.33)	
Duration of menstrual discharge (days)				
< 6	56 (51.85)	80 (71.43)	44 (73.33)	11.901 (< 0.003)*
≥ 6	52 (48.15)	32 (28.57)	16 (26.67)	
Pain at the time of menstrual discharge				
Pain	74 (68.52)	92 (82.14)	47 (78.33)	5.821 (> 0.054)
No pain	34 (31.48)	20 (17.86)	13 (21.67)	
Duration of peak menstrual discharge (days)				
1	57 (52.78)	63 (56.25)	38 (63.33)	1.750 (> 0.417)
2	51 (47.22)	49 (43.75)	22 (36.67)	
Nature of menstrual discharge				
Fluid	8 (7.41)	4 (3.57)	1 (1.67)	3.355 (> 0.187)
Fluid and clot	100 (92.59)	108 (96.43)	59 (98.33)	
Absenteeism from school due to menstrual discomfort				
Yes	27 (36.49)	18 (19.35)	11 (23.4)	6.498 (< 0.039)*
No	47 (63.51)	75 (80.65)	36 (76.6)	
Presence of white discharge				
Present	67 (62.04)	57 (50.89)	16 (26.67)	19.362 (< 0.000)*
Absent	41 (37.96)	55 (49.11)	44 (73.33)	

*p-value is significant

and that the urban girls are more aware about menstrual hygienic practices than the rural girls.⁽²²⁾

Menstrual disturbances are common among the adolescent age groups, and are often explained by the immaturity of the hypothalamic-pituitary-gonadal axis.⁽⁶⁵⁾ In India, a large section of the adolescent girls do not have *a priori* information and awareness about the menstrual cycle and its biology.⁽³⁶⁻³⁸⁾ Therefore, most of the young girls neither perceive the normal variability in the menstrual characters nor its dysfunction. It is well established that at the population level, natural variability exists in most of the human biological characters within and between populations. Regarding the biology of menstruation, different scholars have carried out research on its characteristics or dysfunction. However, to the best of our knowledge, none have attempted to find out the variations in the menstrual characteristics among the unmarried adolescents of different age groups, and to identify the probable socioeconomic and other menstrual characteristics that can significantly predict a particular menstrual outcome. The present study was an endeavour made to meet these two objectives among the unmarried adolescent girls in the State of West Bengal, India.

METHODS

The present study was conducted on the adolescent girls residing in Habra Municipal Corporation area of the district of 24 Parganas (North), of the State of West Bengal, India. This is a periurban locality, situated about 60 km north to the city of Kolkata, the state capital. The study population comprised unmarried girls of early, middle and late adolescence and they were all of the same ethnic group. The classification of the age groups was done on the basis of the following criteria. Early adolescents (Group I): in the eighth and ninth standards, of age group 14–15 years and had menarche at least one year preceding the date of study; middle adolescents (Group II): in the 11th and 12th standards, of age group 16–18 years and had menarche at least three years preceding the date of study; late adolescents (Group III): undergraduate, of age group 19–20 years and had menarche at least five years preceding the date of study.

The subjects of the present study were selected from four educational institutes located in this Municipal Corporation area. Out of these four institutes, three were higher secondary schools and one was an undergraduate college. The selection of the secondary schools was made

Table II. Medical consultation for different types of menstrual problems according to age categories.

Medical consultation sought for	Age category, no. (%)			χ^2 (p-value)
	I	II	III	
Irregularity and/or skipped period				
Yes	9 (8.41)	9 (8.03)	3 (5.17)	0.619 (> 0.734)
No	98 (91.58)	103 (91.96)	55 (94.82)	
Premenstrual problems				
Yes	20 (33.33)	9 (12.67)	9 (25.0)	8.027 (> 0.018)*
No	40 (66.66)	62 (87.32)	27 (75.0)	
Any problem related to menstrual discharge				
Yes	30 (46.43)	37 (36.63)	17 (33.33)	0.172 (> 0.918)
No	56 (53.57)	64 (63.67)	34 (66.67)	
Problem of white discharge				
Yes	17 (25.37)	15 (26.32)	4 (25.0)	0.211 (> 0.9)
No	50 (74.63)	42 (73.68)	12 (75.0)	

* p-value is significant

randomly from a whole list of schools of that area which had certain features in common, such as the vernacular as a medium of instruction (i.e. Bengali), uniform tuition fee structure, girls-only school, and education offered is up to the 12th standard. The girls of Groups I and II were selected from these schools, and the girls of Group III from the solitary undergraduate college located in that area that caters to a large number of students who graduate from these secondary schools.

An overwhelming majority of the students from these four educational institutions came from the same locality, and were of a particular social group. A total number of 280 adolescent girls were selected for the study. Out of these, 108, 112 and 60 girls were from the early, middle and late adolescence groups, respectively. No proper sampling technique was adopted in selecting the subjects. The subjects who volunteered to participate in the study and also corresponded with the criteria for the desired age categories were incorporated in the study. Prior permission was obtained from the selected educational institutions, and the nature and the purpose of the study were explained to the participating subjects before conducting the study. A pre-tested and structured questionnaire was used to collect the data on menstrual characteristics and hygienic practices. The data was collected in person from the subjects, by one of the authors (SS), using the questionnaire.

Data on the socioeconomic status included age, educational level of the parents and of the subjects, and occupation of the parents. The date of the first menstruation (menarche) was collected from the subjects, by recall method (to the nearest month, if not date). A few of the girls were not able to recall their age at menarche. In those cases, they were asked to recall the season or some festivals nearest to their onset of menstruation, so that their age at menarche could be assessed. The subjects were asked if they had experienced "irregular periods" and

complete skipping of a cycle in the last one-year period preceding the date of the survey. Irregular periods and skipping of the menstrual cycle were respectively defined as menstruation that took place at a nonspecific interval of time, and as a complete skip of menstrual cycle at least once. Data on menstrual characteristics (premenstrual and at the time of menstruation) and other gynaecological problems were collected on the basis of the experience reported by the subjects during the three months preceding the date of interview.

Premenstrual problems were defined as symptoms experienced just a few days before the menstruation started. These included abdominal pain, back pain, vomiting, headache, flatulence, diarrhoea, feeling of heaviness, tenseness, emotional irritability, acne and breast tenderness. Data on menstruation included abdominal pain, heavy menstrual discharge, scanty discharge, days of peak discharge, duration of discharge and nature of discharge. Data on other gynaecological problems included white discharge, itching around the genital area, painful menstrual cramps, vaginal odours, white patches, blisters, permanent scarring, burning sensation during urination, and continuous leakage of urine. Menstrual hygienic practices were assessed in terms of the type of absorbent used at the time of menstrual discharge, and on the type of perineum care. The present study was conducted between March 2005 and May 2005. The data analysis was done using the Statistical Package for Social Sciences version 7.5 (SPSS Inc, Chicago, IL, USA).

RESULTS

The mean age and standard error of the mean (SEM) of the girls of Groups I, II and III were 14.57 ± 0.05 years, 17.37 ± 0.07 years and 19.25 ± 0.06 years, respectively. The mean and median ages at menarche of the girls (irrespective of age groups) selected for the study were 12.8 ± 1.12 years and 13.0 years, respectively (Group I 12.5 ± 0.87 ; Group II

Table III. Logistic regression showing significant predictors of a menstrual outcome.

	Menstrual cycle irregularity	Premenstrual back and/or abdominal problem	Duration of menstrual discharge (≥ 6 days)	Duration of peak menstrual discharge (2 days)	Absence of pain during menstruation	Prevalence of white discharge
Age category		NS		NS	NS	
Group III (r)	1.00		1.00			1.00
Group I	15.1550** (1.6240–141.4279)		4.1067* (1.1543–14.6104)			21.0842*** (5.9306–74.9577)
Group II	4.6295 (0.7823–27.3974)		1.0665 (0.3895–2.9201)			5.9283*** (2.2129–15.8816)
Mother's occupation		NS	NS	NS	NS	NS
Working (r)	1.00					
Non working	5.69** (1.6843–19.2268)					
Father's occupation	NS			NS	NS	NS
Service (r)		1.00	1.00			
Others		0.3167** (0.1617–0.6199)	0.4315* (0.2083–0.8939)			
Menstrual pain	NS		NS		-	NA
Absent (r)		1.00		1.00		
Present		2.7919** (1.4026–5.5572)		3.0480*** (1.5176–6.1219)		
Menarche	NS	NS	0.6977** (0.5283–0.9212)	NS	NS	NA
Duration of peak discharge (days)	NS	NS		-	NA	
Two (r)				1.00		1.00
One			0.2775*** (0.1536–0.5013)		3.0971*** (1.5172–6.3221)	
Duration of menstrual discharge (days)	NS	NS	-		NS	NA
> 6 (r)				1.00		
≤ 6				0.2856*** (0.1594–0.5116)		
Premenstrual back and/or abdominal pain	NS	-	NS	NS		NA
Present (r)					1.00	
Absent					2.6195** (1.3240–5.1826)	
Mode of cleaning of genitals	NA	NA	NA	NA	NA	
Soap and water (r)						1.00
Water only						0.4107** (0.2196–0.7681)

*p < 0.05; ** p < 0.01; ***p < 0.001

NS: not significant; NA: not applicable; r: reference category

None of the variables has been found significant for the menstrual outcomes like skipping of menstrual cycle and nature of menstrual discharge nor are these variables (along with the educational levels of the father, mother and subjects) significant predictors to any of the dependent variables. For the problem of white discharge, the type of absorbent used is not a significant predictor variable and hence is not presented in the table.

12.9 \pm 1.12; Group III 13.06 \pm 1.43 years). The educational levels of the fathers and mothers of the majority of the girls were above tenth standard (124, 44.3%) and below tenth standard (109, 38.9%), respectively. The fathers of most of the girls were engaged in service or office jobs (201, 71.8%), followed by skilled or unskilled labour (75,

26.7%). The mothers of these girls (all four groups) were mostly homemakers (224, 80.0%).

The majority of the girls of all the groups reported that their menstrual period was not regular, but the irregularity decreased significantly with the increase in age (Table I). Most of the girls in Group I had skipped their menstrual

Table IV. Logistic regression showing significant predictors of medical consultations for various problems.

	Not consulting doctors for premenstrual back and/or abdominal pain	Not consulting doctors for white discharge
Father's occupation		
Service (r)	1.00	
Others	3.3204* (1.1001–10.0217)	
Mother's educational level		
Above secondary (r)		1.00
Secondary and below		3.8719* (1.1019–13.6054)
Educational level of subject		
Above secondary (r)		1.00
Secondary and below		0.2389* (0.0658–0.8670)

*p < 0.05; r: reference category

Variables like father's educational level and mother's occupation are not significant predictors to any of these dependent variables, and hence have been excluded from the table.

cycle at least once in the past year, followed by those in Groups III and II, the difference of which was statistically significant (Table I). However, only 7.58% of these girls irrespective of the groups sought medical advice and treatment for their problem related to irregularity in and/or skipping of their menstrual periods (Table II). More than 50% of the girls of all the groups suffered from some form of premenstrual problems, of which the overwhelming majority reported "back and/or abdominal pain" (Table I). Of the few who sought medical advice and treatment for premenstrual problems, the majority are from Group I, followed by those from Groups III and II. The difference in seeking medical advice and treatment for premenstrual problems by the girls of these three groups is statistically significant (Table II).

Among the majority of the girls, the duration of menstrual discharge lasted for < 6 days; the highest percentage was found in Group III, followed by the other two groups, and the difference was statistically significant. The mean, median and modal values of the duration of menstrual discharge were 5.3 ± 1.32 , 5.0 and 5.0 days, respectively. More than half of the girls, irrespective of the age groups, experienced the peak menstrual discharge in any one day (between the first and the third day of the menstrual discharge), followed by two days (Table I). The girls mostly had their peak menstrual discharge on the second day (Group I 42, 38.9%; Group II 48, 42.9%; Group III 29, 48.3%), followed by the first two days (Group I 24, 22.2%; Group II 32, 28.6%; Group III 12, 20.0%). Less than one-fifth of the girls of all the groups did not perceive any problem at the time of menstruation (Group I 21, 19.4%; Group II 11, 9.82%; Group III 9, 15.0%). The experience of pain at the time of menstruation had been reported by most girls, and the frequency was the highest by the girls of Group II, followed by Groups III

and I (Table II).

Of the other types of problems related to menstruation, "heavy menstrual discharge" was reported more frequently by the girls in Groups I (13, 14.94%) and III (12, 23.53%), compared to the girls in Group II (3, 2.97%). In contrast, some girls in Group II reported to have experienced "pain with scanty discharge" (18, 17.82%), compared to those in Group I (7, 8.05%) and none from Group III. A small number of girls from all three age groups stayed home from school/college due to the discomfort from pain and/or heavy discharge; the highest percentage was from Group I, followed by Groups III and II, and the difference was statistically significant (Table I). An overwhelming majority (> 92%) of the girls reported the nature of menstrual discharge to be in the form of a mixture of fluid and clots (Table I). Less than half of the girls who sought medical attention for problems related to the menstrual discharge, were mostly from Group I, followed by Groups II and III (Table II).

Reporting of a white discharge emerged as a major gynaecological problem and has been reported by more than half of the girls from Groups I and II, compared to those in Group III, which was statistically significant (Table I). Around 25% of the girls sought medical advice on the problem of having a white discharge, and the majority of these girls experienced the nature of the discharge as thick and curd-like. (Table II). The other gynaecological morbidities were reported in very low frequency. A majority of the girls, irrespective of the age groups (190, 67.9%), used commercial sanitary napkins as an absorbent during the days of menstrual discharge, compared to less than half of them (90, 32.1%), who used pieces of cloth. No significant association was found between the type of absorbent used and the presence of gynaecological problems. In general, almost all the girls

(bar one) cleaned their genital organs regularly more than twice a day, of which the majority (193, 68.9%) used "normal water" only, and a minority (84, 30.0%) of the girls used "soap and normal water" for cleaning their genitals.

Logistic regression was performed to find out the significant predictors for each of the menstrual characters. Thus, for a particular menstrual outcome (dependent variable), a number of socioeconomic and menstrual characteristics (other than the dependent variable) were considered as predictor variables. Socioeconomic variables, such as educational levels of the parents and subjects and occupation of the parents, were included as independent variables. Age groups and menstrual characteristics, such as irregularity in the menstrual cycle, skipping of menstrual cycles, premenstrual problems, duration of menstrual discharge, duration of peak menstrual discharge, pain at the time of menstrual discharge, age at menarche, and the nature of discharge, were considered as the independent variables (barring the one selected as a dependent variable). In case of the problem of white discharge, the probable predictor variables considered in the analysis were the age groups of the subjects, the type of absorbent used, mode of cleaning of genitals, educational levels of the parents and the subjects, occupations of the parents, and the age groups of the subjects. Similarly, logistic regression was also performed to find out the probable socioeconomic variables, which could be the significant predictors for medical consultation for different types of menstrual problems. The dependent variables which have significant association with some predictor variables are presented in Tables III and IV.

The odds-ratio (OR) of irregularity in the menstrual cycle decreased with the increase in age. The girls of Group I were 15 times more likely to encounter cycle irregularity than those of the reference category. The OR of irregularity was significantly higher among the girls whose mothers were homemakers compared to those who were working (OR 5.6). The OR of experiencing premenstrual abdominal and/or back pain was increased by 70% and by three times among the girls whose fathers worked in the service sector (OR 0.3), and the girls who experienced "pain at the time of menstrual discharge" (OR 2.7), respectively. The OR of experiencing menstrual discharge for ≥ 6 days were four times more in girls of Group I (OR 4.1), were increased by 57% and 73% among the girls whose fathers worked in the service sector (OR 0.43) and whose peak discharge lasted for two days, respectively (OR 0.27). Age at menarche was also a significant predictor for the duration of menstrual discharge.

The OR of experiencing peak menstrual discharge for two days were three times more likely among the girls who reported pain during the time of menstrual discharge (OR 3.04), and were increased by 72% among the girls who experienced menstrual discharge for < 6 days (OR 0.28). The OR of not having pain at the time of menstrual discharge increased by three times and 2.6 times among the girls whose peak discharge lasted for one day only (OR 3.09), and who do not experience premenstrual back and/or abdominal pain (OR 2.6), respectively. A number of biological and behavioural characteristics were associated with the problem of white discharge. Girls from Group I and Group II were 21 and 6 times, respectively, more likely than those from Group III to suffer from the problem of white discharge. The mode of cleaning of genitals was also found to be a significant predictor of being affected with a white discharge. The OR of being affected with a white discharge was reduced by 59% among the girls who cleaned their genitals with normal water compared to the reference category.

As stated before, a minority of the girls consulted a doctor for any of the morbid conditions associated with their menstrual cycle and white discharge. Significant predictors for consulting doctors were only found in cases of premenstrual problems and white discharge. The OR of not consulting a doctor for premenstrual problems was three times more among the girls whose father's occupation was not in the service sector (OR 3.3). The educational levels of mothers and the subjects were found to be the significant predictors for consulting doctors for the problem of white discharge. The OR of not seeking medical consultation for the problem of white discharge was four times more among the girls whose mothers have an educational level of "secondary or below" (OR 3.8), and increased by 77% in the girls whose own education was at "secondary level and above", respectively (Table IV).

DISCUSSION

The adolescent group comprises one-fifth of the total population of the world,^(39,42) and in India, about 22% of the population falls into this age group.^(43,44) The nature of adolescence varies tremendously by age, gender, marital status, class, region and cultural context. Although adolescence is a healthy period of life, this phase brings forth another dimension of health, i.e. reproductive health, about which most of the adolescents are not concerned. Menstrual health, which is one of the major areas of concern in reproductive health, affects a large number of women throughout their reproductive life from adolescence. Moreover, menstrual disorders and improper

hygienic care have direct consequences in fertility and reproductive tract infections, respectively. The 1994 International Conference on Population and Development held in Cairo recommended that governments should focus more attention on their adolescents through an integrated approach to their health, education and social needs.⁽⁴⁵⁾ The government of India has moved from rhetoric to action by adopting a Reproductive Health approach to strengthen and broaden the scope of the family welfare programme. The National Population Policy 2000, India, has recognised adolescents as an under-served, vulnerable group that needs to be provided with reproductive health information and services.⁽⁴⁶⁾ The present study was conducted to explore the variations in menstrual characteristics among the unmarried adolescents across three different age groups and to find out the predictor variables (socioeconomic and other menstrual variables) for a particular menstrual outcome. Like other parts of the world, the age at menarche of the Indian girls is declining, and the mean age at menarche of the present study is lower than that of Indian girls in a study published in 1993,⁽⁴⁷⁾ but similar to that of Malaysian and Swedish girls.^(24,35)

The results of bivariate analysis reflect that significant differences exist among the adolescent girls of the three age groups (Groups I, II and III) in menstrual characteristics such as irregularity in and skipping of menstrual cycles, duration of menstrual discharge, and in absenteeism from school because of discomfort related to menstruation. Significant differences also exist between these three groups of girls with regard to the incidence of a white discharge. A multivariate analysis of the data suggests that some of the menstrual characteristics (like irregularity in the menstrual cycle, presence of premenstrual problems, duration of menstrual discharge, duration of peak menstrual discharge, and pain at the time of menstrual discharge) could be significantly predicted with the help of some other menstrual characteristics and/or socioeconomic variables. Again, some of the socioeconomic variables have been found to be significantly associated with seeking medical consultation for menstrual and gynaecological disorders. Among the adolescents, menstrual disorders and gynaecological problems are not uncommon in India,^(48,49) and a study from this country showed that the mothers and other female kin make these young girls perceive these problems as a regular and integral part of women's health.⁽²⁵⁾ For the present study, this could also be a plausible reason why a large number of girls do not seek medical attention in spite of their morbid conditions related to their menstrual cycle and white discharge. The incidence of premenstrual syndromes among the girls in the present study is similar with other studies carried out

in India,⁽⁸⁾ but it is less than those experienced by Saudi,⁽¹⁹⁾ Malaysian⁽²⁴⁾ and African American girls.⁽²³⁾

The present study showed that the menstrual cycle and the duration of menstrual discharge tend to become regular and shorter, respectively, with the increase in age, suggesting a gradual attainment of ovarian maturity with time. The modal value of the duration of menstrual discharge and the experience of peak discharge on the second day of menstruation are similar to that of Japanese girls.⁽²⁷⁾ The frequency of variations in dysmenorrhoea or "pain at the time of menstruation," and menorrhagia or "heavy discharge," found in the present study groups are similar to that of the other studies carried out in India and elsewhere.^(7,16,17,23,24) On the other hand, compared to the girls in the present study, the problem of dysmenorrhoea is respectively higher and lower among the South Indian and Nepali girls.^(22,34,50) Approximately one-fifth of the girls in the study group remained absent from school or college due to pain and/or discomfort related to menstruation; this incidence is lower than that of studies carried out in South India^(22,34) and Saudi Arabia.⁽¹⁹⁾

The present study shows that socioeconomic variables, like the occupations of the parents, have a significant relationship with irregularity in the menstrual cycle, premenstrual problems and duration of menstrual discharge. Again, the occupations of the fathers and the educational levels of the mothers are significantly associated with seeking medical consultation for premenstrual problems and white discharge. The age of the subjects, especially those aged 14–15 years, was also found to have a significant relationship with an irregular menstrual cycle, longer duration of discharge and the problem of white discharge. Pain at the time of menstruation and premenstrual back and/or abdominal pain have a one-sided relationship. Girls, who had their peak discharge for one day, menstruated for a shorter duration and experienced no pain. It is also very interesting to note that the increase in age and the different modes of cleaning the genitals are significantly associated with the prevalence of the problem of white discharge. However, contrary to expectations, there was no association between the type of absorbents used and the problem of white discharge. The findings of the present study, which was based on a small sample size in a local population within a particular biological and cultural context, need to be substantiated, with further studies using a large sample size, with different regions and ethnic groups. The database thus generated will be useful for the health planners and practising physicians to develop strategies to improve the reproductive health situation of the adolescent population of the community and of the country.

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REFERENCES

- Harlow SD. What We Do and Do Not Know About the Menstrual Cycle; Or Questions Scientists Could Be Asking. New York: The Population Council, 1995.
- Walraven G, Ekpo G, Coleman R, et al. Menstrual disorders in rural Gambia. *Stud Fam Plann* 2002; 33:261-8.
- Münster K, Schmidt L, Helm P. Length and variation in the menstrual cycle--a cross sectional study from a Danish county. *Br J Obstet Gynaecol* 1992; 99:422-9.
- Power C, Matthews S. Origins of health inequalities in a population sample. *Lancet* 1997; 350:1584-9.
- Rowland AS, Baird DD, Long S, et al. Influence of medical conditions and lifestyle factors on the menstrual cycle. *Epidemiology* 2002; 13:668-74.
- Rahman MM, Kabir M, Shahidullah M. Adolescent self reported reproductive morbidity and health care seeking behaviour. *J Ayub Med Coll Abbottabad* 2004; 16:9-14.
- Dutta S, Ray S. Menstrual health problems and hygienic practices among the adolescent girls of rural and periurban areas of West Bengal. *J Fam Welf* 2006; 52:73-85.
- Basu K, Das S, Ray S. Menstruation: A study on menstrual disorders and hygienic practices of adolescent girls of two contrasting socioeconomic groups of West Bengal, India. *Indian J Phys Anthropol Hum Genet*. In press.
- Goodenough J, Wallace RA, McGuire B. *Human Biology: Personal, Environmental and Social Concerns*. New York: Saunders College Publishing, 1998.
- Fox SI. *Human Physiology*. 9th ed. New York: McGraw-Hill, 2004.
- Ylikorkala O, Dagwood MY. New concepts in dysmenorrhea. *Am J Obstet Gynecol* 1978; 130:833-47.
- Beek JS. *Puberty and Dysmenorrhea Treatment: Novice's Gynecology*. Philadelphia: Williams and Wilkins, 1996.
- Dagwood MY. 'Dysmenorrhea'. *J Reprod Med* 1995; 30:154-67.
- Kjerulff KH, Erickson BA, Langenberg PW. Chronic gynecological conditions reported by US women: findings from the National Health Interview Survey, 1984 to 1992. *Am J Public Health* 1996; 86:195-9.
- Kaunitz AM. Menstruation: choosing whether... and when. *Contraception* 2000; 62:277-84.
- Patel BC, Khan ME. Reproductive health problems of women in rural Uttar Pradesh: observations from a community survey. *Soc Change* 1996; 26:245-70.
- Koenig M, Jejeebhoy S, Singh S, Sridhar S. Investigating women's gynaecological morbidity in India: not just another KAP survey. *Reprod Health Matters* 1998; 11:84-97.
- Harlow SD, Campbell OM. Menstrual dysfunction: a missed opportunity for improving reproductive health in developing countries. *Reprod Health Matters* 2000; 8:142-7.
- Moawed S. Indigenous practices of Saudi girls in Riyadh during their menstrual period. *East Mediterr Health J* 2001; 7:197-203.
- Chompootaweep S, Tankeyoon M, Poomsuwan P, Yamarat K, Dusitsin N. Age at menarche in Thai girls. *Ann Hum Biol* 1997; 24:427-33.
- Poureslami M, Osati-Ashtiani F. Attitudes of female adolescents about dysmenorrhea and menstrual hygiene in Tehran suburbs. *Arch Iran Med* 2002; 5:219-24.
- Narayan KA, Simivasa DK, Pelto PJ, Verrammal S. Puberty rituals reproductive knowledge and health of adolescent school girls in South India. *Asia Pac Popul J* 2001; 16:225-38.
- Houston AM, Abraham A, Huang Z, D'Angelo LJ. Knowledge, attitudes, and consequences of menstrual health in urban adolescent females. *J Pediatr Adolesc Gynecol* 2006; 19:271-5.
- Lee LK, Chen PC, Lee KK, Kaur J. Menstruation among adolescent girls in Malaysia: A cross-sectional school survey. *Singapore Med J* 2006; 47:869-74.
- Joshi BN, Chauhan SL, Donde UM, et al. Reproductive health problems and help seeking behavior among adolescents in Urban India. *Indian J Pediatr* 2006; 73:509-13.
- Thomas SL, Ellertson C. Nuisance or natural and healthy: should monthly menstruation be optional for woman? *Lancet* 2000; 355:922-4.
- Matsumoto S, Nogami Y, Ohkuri S. Statistical studies on menstruation: a criticism on the definition of normal menstruation. *Gunma J Med Sci* 1962; 11:294-318.
- World Health Organization multicenter study on menstrual and ovulatory patterns in adolescent girls. II. Longitudinal study of menstrual patterns in the early postmenarcheal period, duration of bleeding episodes and menstrual cycles. World Health Organization Task Force on Adolescent Reproductive Health. *J Adolesc Health Care* 1986; 7:236-44.
- Women's bleeding patterns: ability to recall and predict menstrual events. World Health Organization Task Force on Psychosocial Research in Family, Planning, Special Programme of Research, Development and Research Training in Human Reproduction. *Stud Fam Plann* 1981; 12:17-27.
- Hallberg L, Högdahl AM, Nilsson L, Rybo G. Menstrual blood loss--a population study. Variation at different ages and attempts to define normality. *Acta Obstet Gynecol Scand* 1966; 45:320-1.
- Wasserheit JN, Harris JR, Chakraborty J, Kay BA, Mason KJ. Reproductive tract infections in a family planning population in rural Bangladesh. *Stud Fam Plann* 1989; 20:69-80.
- Khanna A, Goyal RS, Bhawsar R. Menstrual practices and reproductive problems: A study of adolescent girls in Rajasthan. *Journal of Health Management* 2005; 7:91-107.
- Misra A. Menstruation: crisis in adolescence. In: Mehra S, ed. *Adolescent Girl: An Indian Perspective*. New Delhi: MAMTA, 1995:75-8.
- Drakshayani Devi K, Venkata Ramaiah P. A study on menstrual hygiene among rural adolescent girls. *Indian J Med Sci* 1994; 48:139-43.
- Wiksten-Almströmer M, Hirschberg AL, Hagenfeldt K. Menstrual disorders and associated factors among adolescent girls visiting a youth clinic. *Acta Obstet Gynecol Scand* 2007; 86:65-72.
- Vlassoff C. Educating female adolescent: possibilities and limitations for social change and population learning in rural India. *Demography India* 1978; 7:175-93.
- Bhende AA. A study of sexuality of adolescent girls and boys in underprivileged groups in Bombay. *Indian J Social Work* 1994; 55:557-71.
- Bhende A. Evolving a model for AIDS prevention education among underprivileged adolescent girls in Urban India. Washington DC: International Center for Research on Women; 1995 Mar. Report no: 5USAID.
- World Health Organization. Programming for adolescent health and development. Report of a WHO/UNFPA/UNICEF study group on programming for adolescent health. Geneva: World Health Organization; 1999. Report no. WHO Technical Report Series 886 [online]. Available at: [www.who.int/trs/WHO_TRS_886_\(p1-p144\).pdf](http://www.who.int/trs/WHO_TRS_886_(p1-p144).pdf). Accessed May 14, 2008.
- United Nations. World population prospects: The 1998 revision. Volume I: Comprehensive tables. New York: United Nations, Department of Economic and Social Affairs, Population Division, 1999.
- World Health Organization. Adolescent friendly health services: an agenda for change. Geneva: WHO, Department of Child and Adolescent Health Development, 2002 [online]. Available at:

- www.who.int/reproductive-health/publications/cah_docs/cah_02_14.pdf. Accessed May 14, 2008.
42. Program for Appropriate Technology in Health (PATH). Adolescent Reproductive Health. Seattle: PATH, 2004 [online]. Available at: www.path.org. Accessed January 5, 2006.
 43. International Institute for Population Sciences (IIPS) & ORC Macro. National Family Health Survey (NFHS-2), 1998-99: India, Mumbai: IIPS, 2000.
 44. United Nations. World Population Prospects: The 2000 revision. Volume II: The sex and age distribution of the world population. New York: United Nations, 2001.
 45. United Nations. Report of the International Conference on Population and Development, Cairo, 5-13 September 1994. New York: United Nations, 1995.
 46. National Population Policy 2000. New Delhi: Ministry of Family Welfare, Government of India.
 47. Bhatia BD, Chandra R. Adolescent mother -- an unprepared child. *Indian J Matern Child Health* 1993; 4:67-70.
 48. Bang RA, Bang AT, Baitule M, et al. High prevalence of gynaecological diseases in rural Indian women. *Lancet* 1989; 1:85-8.
 49. Bhalchandra G, Soundra S, Rajaram P. Gynaecological problems in adolescents. *J Obstet Gynecol India* 1993; 43:599-604.
 50. Karki C. Study of young people attending an adolescent friendly centre. *Kathmandu Univ Med J (KUMJ)* 2004; 2:324-30.



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