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Original Research Article

Current patterns of menstrual health and hygiene among adolescent and young women of 15-24 years from rural northern India: a community based cross sectional study

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ABSTRACT

Background: Menstrual health has an impact on physical, mental and social well-being of young women. Young women in rural areas may face peculiar challenges related to menstrual health and hygiene management (MHHM). In view of evolving lifestyle and behavioural changes in transitional world, there is a need for latest community-based study among young women in rural India. Therefore, we aimed to estimate the magnitude of problems associated with MHHM, and to identify the factors associated with menstrual problems and menstrual hygiene.
Methods: House visits were made in the selected villages of Ballabgarh block of Haryana, and 483 non-pregnant women aged 15-24 years were interviewed regarding socio-demographic characteristics and menstrual history (on age of menarche, irregular menstrual bleeding, sanitary pad usage, heavy menstrual bleeding, dysmenorrhea, period fatigue). Dietary diversity was assessed using women dietary diversity (WDD) scale. Multivariable logistic regression analyses were done to identify factors associated with different menstrual problems and strict sanitary pad usage.
Results: The prevalences of heavy menstrual bleeding, dysmenorrhea and period fatigue were 20.9%, 26.3%, and 32.0% respectively. Age and marital status were associated with dysmenorrhea. Low dietary diversity was associated with period fatigue. Menarche was delayed among 26.9% and early by 20.8% of the participants. More than nine out of ten participants (92.8%) strictly use sanitary pads. Heavy menstrual bleeding was associated with lesser strict use of sanitary pads.
Conclusions: Menstrual problems were common among young women in rural India, and heavy menstrual bleeding was associated with lesser strict use of sanitary pads.

Keywords: Dysmenorrhea, Menarche, Menorrhagia, Menstrual hygiene, Menstruation disturbances, Oligomenorrhea

INTRODUCTION

Menstruation is a natural biological process that significantly impacts women's lives.[1] World Health Organization defines health as "a state of complete physical, mental, and social well-being", which is particularly relevant to menstruation. Menstruating women may experience symptoms like heavy bleeding, cramping, fatigue, headaches, mood swings, and irritability. For some, these symptoms can disrupt daily activities, affecting their quality of life.[2,3] Cultural stigma and restrictive practices can further influence menstrual well-being.[2] Lack of health-seeking behaviour for menstrual-related issues complicates these issues further.[4,5]

Menstrual problems can indicate underlying disorders of female urogenital and endocrine systems, and further pre-dispose to conditions like anaemia, osteoporosis,

metabolic syndrome, coronary heart disease, mental health illnesses, infertility and pregnancy related complications.[6] Proper menstrual hygiene management is essential to improve menstrual well-being and reduce the risk of infections.[2] Hence, addressing both menstrual health and hygiene is vital.

In India, research on menstrual health and hygiene has primarily focused on school-going adolescents, often missing adolescent and young women with major menstrual problems as these issues can cause school absenteeism.[1,7,8] There is a lack of community-based studies in rural areas, where access to safe and hygienic menstrual products is limited.[9] Most Indian studies have concentrated on adolescents aged 10-19 years, though evidence shows menstrual disorders like dysmenorrhea peak between 20-24 years.[10] Hence, it's crucial to study beyond adolescence, particularly in rural areas, to improve reproductive health outcomes among young women (15-24 years). Lifestyle changes like reduced physical activity and dietary shifts are increasingly affecting menstrual health. Though some evidences suggest a link between diet and menstruation, community-based studies in India are yet to explore this association.[11]

Hence, this study aimed to estimate the prevalence of menstrual problems (heavy bleeding, dysmenorrhea, irregular cycles, fatigue, and delayed menarche) among women aged 15-24 years in rural Haryana. Our secondary objective was to identify factors associated with menstrual problems and menstrual hygiene practices among participants.

METHODS

Study type

It was a cross-sectional (community-based) study.

Study setting

The study was conducted in the five largest villages in Ballabgarh block, district Faridabad, Haryana. These villages were part of the health and demographic surveillance site (HDSS), Ballabgarh. Demographic and health-related information were available and regularly updated in computerized health management and information system (HMIS).

Study period

The data were collected from May-June 2022.

Selection criteria

The study participants were women aged 15-24 years. The exclusion criteria were: (a) pregnant and lactating women (within 6 months of delivery), (b) women who were yet to attain menarche or had menarche within the last three months, and (c) women migrated outside the HDSS.

Sample size and sampling strategy

Due to lack of data availability for the age group of 15-24 years, the prevalences of heavy menstrual bleeding and dysmenorrhea reported among adolescent women aged 10-19 years (17.8% and 49.1%) were considered.5 Based on the least prevalence, the estimated sample size was 444 (relative precision =20%, alpha error =5%). We accounted for non-response rate (10%) and pre menarche status (5%) to adjust and round off the final sample size to 530 women.

A list containing details of all the women aged 15-24 years in the five selected villages of HDSS (n=3484, as per census 2022) was obtained from HMIS and used as sampling frame. From this frame, 530 women were selected, and house-to-house visits were made.

Data collection procedure

The interview schedule was administered in three parts:

Self-designed, pre-tested, structured interview schedule

This had questions to collect information on socio-demographic characteristics, marital and obstetric history.

Dietary diversity assessment

Diet history was assessed through a 24-hour recall method. Based on the history, dietary diversity was assessed using women dietary diversity (WDD) scale which yields a score ranging from 0-9.12 Based on WDD score, participants were classified into three categories: (a) high dietary diversity (WDD score: 7-9), (b) medium dietary diversity (WDD score: 4-6), and (c) low dietary diversity (WDD score: 0-3).[13]

Menstrual history assessment

The study tool on menstrual history collected details on age of menarche, duration, frequency, associated symptoms, and type of sanitary product used during periods. The questions on history of menorrhagia and dysmenorrhoea were based on the tool developed by the Centre for Disease Prevention and Control (CDC).[14]

Operational definitions

Heavy menstrual bleeding was considered to be present, if there was feeling of heavy bleeding (or) if there was a necessity to change the sanitary pads/cloth within two hours, at any time during most of the periods, (or) periods lasting more than seven days.[14]

Dysmenorrhoea was defined as pain during menstruation that incapacitated day to day activities, at any time during most of the periods.[14]

Irregular menstrual bleeding was defined as either: (a) infrequent menstrual bleeding of one or two episodes in

the past three months (or) (b) frequent menstrual bleeding of more than four episodes in the past three months.[15]

Period fatigue was defined as feeling of fatigue so as to incapacitate day to day activities, at any time during most of the periods.

Early menarche was defined as onset of menstruation at or before 12 years of age.[16]

Delay in menarche was defined as absence of onset of menstruation at completed age of 15 years.[17]

Strict sanitary pad usage was defined as using only sanitary pad for menstrual hygiene during most of the periods.

Ethical considerations

The study was approved by the institutional ethics committee and conducted according to Declaration of Helsinki. We obtained informed written consent from all adult participants. For participants less than 18 years of age, informed assent and consent were obtained from the participants and their parents and guardians, respectively. All the participants were provided information regarding menstrual health and hygiene management (MHHM). Participants with menstrual abnormalities were referred to the nearest primary health centre under the HDSS.

Statistical analysis

The data were analysed in STATA version 16. Prevalence of different menstrual problems and strict sanitary product usage were expressed in percentages with 95% confidence interval (CI). Univariable followed by multivariable logistic regression analyses were performed for the outcomes: heavy menstrual bleeding, dysmenorrhoea, period fatigue, and strict sanitary product usage. Independent variables with p value <0.2 in univariable analyses were included in multivariable analyses. Variables with p value <0.05 in multivariable analyses were considered to be significantly associated with the outcomes. Additionally, association between age and early/delayed menarche was assessed by logistic regression. Both unadjusted and adjusted odds ratios (OR) were expressed for all the above analyses.

RESULTS

A total of 520 women were eligible for participation, out of which 483 women participated in the study (92.4%). Many of the participants were unmarried (81.0%), students (73.1%), and belonged to Above Poverty Line (APL) category (83.6%) (Table 1). Out of the total, 62 (12.8%) had past history of pregnancy, 51 (10.6%) had parity of at least one, and 22 (4.6%) had a history of abortion.

The prevalence of heavy menstrual bleeding was 20.9% (n=101) (95% CI: 17.4-24.8%). Dysmenorrhea was present among 26.3% (n=127) (95% CI: 22.4-30.5%) of the participants. Participants aged 20-24 years had 1.98 (95% CI: 1.10-3.55) significantly higher odds of dysmenorrhoea (p=0.02). Married participants and participants with heavy menstrual bleeding had significantly higher odds of dysmenorrhoea (p=0.01) (Table 2). Home makers had 4.23 times significantly higher odds of heavy menstrual bleeding (95% CI: 1.15-15.56) (p=0.03) (Table 2).

Table 1: Distribution of participants by socio-demographic and other characteristics (n=483).

Variables	Total (n=483) N (%)
Years of completed education	
0-5	12 (2.5)
6-8	55 (11.4)
9-10	155 (32.1)
11-12	168 (34.8)
>12	93 (19.2)
Possession of below poverty line (BPL) card	
No	404 (83.6)
Yes	79 (16.4)
Marital status	
Unmarried	391 (81.0)
Married and living together	92 (18.6)
Married and separated	2 (0.4)
Occupation	
Unemployed	36 (7.5)
Student	353 (73.1)
Home maker	71 (14.7)
Other working women[a]	23 (4.8)
Women dietary diversity category	
Low dietary diversity (WDDS 0-3)	429 (87.6)
Medium dietary diversity (WDDS 4-6)	61 (12.4)
High dietary diversity (WDDS 7-9)	0 (0)

[a]Others in occupation includes agricultural worker (3), craft worker (11), service worker (4), technician (2) and elementary worker (3)

Infrequent menstrual bleeding was present among 10.1% (n=49) (95% CI: 7.6-13.2%) of the participants, while three participants (0.6%) had frequent menstrual bleeding. Period fatigue was experienced by 32.0% (n=155) (95% CI: 27.9-36.5%) of the participants. Participants with history of heavy menstrual bleeding and dysmenorrhoea had significantly higher odds of experiencing period fatigue (p=0.01). Participants with better dietary diversity had 0.43 significantly lesser odds of experiencing period fatigue (95% CI: 0.20-0.91) (p=0.03) (Table 2).

A total of 462 (95.7%) participants uses sanitary pads during menses. Clothes were used during menstruation by 34 (7.0%) participants, which includes mostly clean cloth users (n=31) (6.4%). Out of the total, 92.8% (95% CI: 90.0-94.9%) (n=448) were strict sanitary pad users. Participants with heavy menstrual bleeding had 64% (95% CI: 24-83%) significantly lesser odds of strictly using sanitary pads during menses (p=0.01) (Table 3).

Table 2: Association of dysmenorrhoea, heavy menstrual bleeding and menstrual fatigue with selected variables (n=483).

Variables	Categories	Total n=483	Outcome N (%)	Unadjusted		Adjusted	
				Odds ratio (95%CI)	P value	Odds ratio (95%CI)	P value
Outcome 1: Dysmenorrhea[a]							
Age group (in years)	15-19	246	55 (22.4)	Ref		Ref	
	20-24	237	72 (30.4)	1.51 (1.01-2.28)	0.04	1.98 (1.10-3.55)	0.02
Marital status	Unmarried	391	109 (27.9)	Ref		Ref	
	Married	92	18 (19.6)	0.63 (0.36-1.10)	0.11	0.42 (0.21-0.83)	0.01
Heavy menstrual bleeding	Absent	382	76 (19.9)	Ref		Ref	
	Present	101	51 (50.5)	4.10 (2.58-6.53)	0.01	4.61 (2.84-7.48)	0.01
Outcome 2: Heavy menstrual bleeding[b]							
Occupation	Unemployed	36	3 (8.3)	Ref		Ref	
	Student	353	74 (21.0)	2.92 (0.87-9.78)	0.08	3.27 (0.94-11.37)	0.06
	Home maker	71	20 (28.2)	4.31 (1.19-15.67)	0.02	4.23 (1.15-15.56)	0.03
	Other working women	23	4 (17.4)	2.31 (0.47-11.47)	0.30	2.38 (0.48-11.87)	0.29
Outcome 3: period fatigue[c]							
Age group (in years)	15-19	246	64 (26.0)	Ref		Ref	
	20-24	237	91 (38.4)	1.77 (1.20-2.61)	0.01	1.85 (1.10-3.11)	0.02
Dietary diversity	Low	424	142 (33.5)	Ref		Ref	
	Medium	59	13 (22.0)	0.56 (0.29-1.07)	0.08	0.43 (0.20-0.91)	0.03
Heavy menstrual bleeding	Absent	382	100 (26.2)	Ref		Ref	
	Present	101	55 (54.5)	3.37 (2.14-5.30)	0.01	2.19 (1.31-3.64)	0.01
Dysmenorrhea	Absent	356	77 (21.6)	Ref		Ref	
	Present	127	78 (61.4)	5.77 (3.72-8.93)	0.01	5.12 (3.18-8.21)	0.01

[a]Variables included in the multivariable analysis were age, years of education, marital status, number of years from menarche, heavy menstrual bleeding. [b]Variables included in the multivariable analysis were occupation and irregular menstrual bleeding. [c]Variables included in the multivariable analysis were age, occupation, dietary diversity category, number of years from menarche, irregular menstrual bleeding, dysmenorrhoea, and heavy menstrual bleeding.

Table 3: Association of strict sanitary pad usage with selected variables (n=483).

Variables	Categories	Total n=483	Strict sanitary pad usage n=448 (%)	Unadjusted		Adjusted	
				Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Years of completed education[a]	≤8	67	53 (79.1)	Ref		Ref	
	9-10	155	144 (92.9)	3.46 (1.48-8.09)	0.01	3.10 (1.19-8.07)	0.02
	11-12	168	161 (95.8)	6.08 (2.33-15.85)	0.01	5.20 (1.78-15.20)	0.01
	>12	93	90 (96.8)	7.92 (21.8-28.85)	0.01	6.35 (1.54-26.15)	0.01
Marital status	Unmarried	391	365 (93.4)	Ref		-	-
	Married	92	83 (90.2)	0.66 (0.30-1.45)	0.30	-	-
Occupation	Unemployed	36	31 (86.1)	Ref		Ref	
	Student	353	334 (94.6)	2.84 (0.99-8.12)	0.05	1.66 (0.51-5.45)	0.40
	Home maker	71	62 (87.3)	1.11 (0.34-3.60)	0.86	1.36 (0.39-4.76)	0.63
	Other working women	23	21 (91.3)	1.69 (0.30-9.56)	0.55	1.60 (0.27-9.65)	0.61
Heavy menstrual bleeding	Absent	382	361 (94.5)	Ref		Ref	
	Present	101	87 (86.1)	0.36 (0.18-0.74)	0.01	0.36 (0.17-0.76)	0.01

[a]Since the number of women with 0-5 years of completed education were low, first two categories of the variable were combined into a single category (i.e. 0-8 years) for the purpose of analysis.

The mean age of menarche was 13.7 (95% CI: 13.6-13.8). Hundred participants (20.7%) had history of menstruation for less than three years. A total of 26.9% (n=130) (95% CI: 23.0-31.3%) had delay in menarche and 20.8% (n=97) (95% CI: 16.6-23.9%) had early menarche. Participants aged 15-19 years had 52.1% (95% CI: 23.8-69.9%) significantly lesser chances of having a history of early menarche (p=0.01). Participants aged 20-24 years had 2.30 (95% CI: 1.52-3.48) significantly higher odds of having a history of delayed menarche (p=0.01).

DISCUSSION

Studies on menstrual health and hygiene in India have predominantly been school-based, with most community-based studies focusing on urban slums, except for one in rural area by Ahamed et al.[3-5,7,8,18-20] Studies had mostly targeted adolescent women aged 10-19 years, with only a few (Ahamed et al and Laksham et al) including women of reproductive age.[3-5,18-20] Our study reported a 20.9% prevalence of heavy menstrual bleeding based on our subjective assessment, which aligns with existing studies.[3-5,18,19,21,22] Objective measurement of menstrual blood loss is more accurate but can neglect subjective perceptions. Reports suggested that the subjective assessment mostly correlated with objective assessment.[23] Subjective assessment of heavy menstrual bleeding is also important, as subjective perceptions can influence happiness, productivity and health seeking behaviour, and thus aligns with holistic view of health.[24] Heavy menstrual bleeding was more common among homemakers, similar to findings observed by Ahamed et al, although the strata size was less.[20] This may be due to the increased stress experienced by Indian homemakers.[25]

Sanitary pads were the most common menstrual hygiene product (95.7%), closely matching the National Family Health Survey (NFHS-5) estimates (96.0%).[26] However the proportion of cloth users in our study (7.0%) was lower compared to NFHS-5 (22.1%), likely due to social desirability bias. More than nine out of 10 women (92.8%) were strict sanitary pad users, and they were found to be having more years of education, as reported by the NFHS-5 as well.[26] Still, the direction of this finding could be either way. While education likely improves menstrual awareness, menstrual problems could also contribute to school dropouts thus impacting years of education. We believe that former explanation would be more likely, as we adjusted this association for occupation, which means that the association holds irrespective of someone being a student or non-student (including dropouts). Women with heavy menstrual bleeding were less likely to be strict sanitary product users. This may be due to (a) the perception that sanitary pads are insufficient for heavy flow, prompting a preference for clothes, or (b) affordability or desirability issues in rural settings. Future qualitative studies could explore this finding further.

Dysmenorrhea had a prevalence of 26.3% in our study, lower than others, likely due to differences in settings, age, and marital status.[3-5,18-22,27] Similar to our findings, Ahamed et al reported a prevalence of <30% among rural women, while studies on urban women reported rates above 40%.[3-5,18-20] Dysmenorrhea is more common in urban women, likely due to stress and lifestyle factors. Lower prevalence reported by Ahamed et al may be attributed to their inclusion of older, married women (18-45 years), who generally have a lower risk of dysmenorrhea.[10,20] Primary dysmenorrhea, responsible for 90% of dysmenorrhoea cases, stems from psychological, hormonal, and neuromuscular factors, which peak around 20-24 years and then decrease then as age advances, and undergo changes post-marriage due to sexual activity and childbirth.[10] This explains why women aged 20-24 years and unmarried women had a higher risk of dysmenorrhea in our study. Additionally, heavy menstrual bleeding may cause uterine congestion leading to pain, making dysmenorrhea more common among women with heavy menstrual bleeding as observed in our study.[10]

Irregular menstrual bleeding affected 10.8% of participants, which was lower compared to other studies.[3-6,18-22] Factors like genetics, intrauterine disorders, lifestyle, and chronic diseases might explain this variation. While we collected a history of chronic disease, we could not analyse its association with irregular menstrual cycles due to the small number of participants reporting such conditions (n=15).

Period fatigue impacting daily productivity, was reported by 32.0% of young women (15-24 years). Malnutrition is often linked to menstrual issues, but we did not find any association between malnutrition (underweight, overweight, or anemia) and menstrual problems.[5,17] However, women with medium dietary diversity were 57% less likely to experience period fatigue than those with low dietary diversity. Similar to our study, Das et al had also observed a link between dietary deficiency and menstrual disorders in their analysis.[27]

Dietary diversity is a marker of adequate intake of micronutrients like vitamins (A, B_1, B_2, B_3, B_6, B_9, B_{12}, C), calcium, iron, and zinc.[12] Most of these are linked to menstrual symptoms, as they influence neurotransmitters or relieve oxidative stress.[12] Despite the biological plausibility, we feel that further studied are needed to clearly establish this relationship due to lack of assessment of temporality and limitations in dietary assessment (non-repetition of dietary diversity assessment).

The mean age of menarche in our study was 13.7 years (95% CI: 13.6-13.8). This might differ from other Indian studies due to differences in year of study, age group included, and study setting (urban/rural).[3-5,18-20] The mean age of menarche is in decreasing trend among Indian women, which means that studies on older women would have reported later mean age of menarche compared to those on younger women (and vice versa), which were reflected in our literature review and analyses.[3-5,16,18,20] This shifting trend might be due to changing lifestyle,

environment, economical and psycho-social factors over time, which are more profound in urban areas. Due to unclear age criteria and changing mean age of menarche, it is difficult to define early and delayed menarche.[16] For delayed menarche, we considered 15 years as cutoff based on clinical guidelines; For early menarche, we chose the most sensitive cutoff among different cutoffs available (between 10-12 years).[16,17] Out of the total, 26.9% of women had delayed menarche and 20.1% had early menarche, which was similar to as what reported by Meher et al.[16] We acknowledge that difficulty in recall may affect our assessment of age at menarche, potentially leading to misclassification.

We excluded pregnant and lactating women due to physiological amenorrhea. We also included women who had recently reached menarche (within the past 2-3 years), acknowledging that about 10% may have menstrual problems.[28] This inclusion may have slightly inflated menstrual problem prevalence, but we analysed and found that there is no significant association between early menarche and menstrual problems. This may ascertain the validity of our findings. The community-based approach with probability sampling was a strength of our study, enabling the inclusion of non-school-going women. Additionally, evidence-based eligibility criteria, high response rate (91.1%), adequate sample size, and the use of standard definitions for menstrual problems ensured the study's validity. Multivariable analyses were employed to address confounding, further strengthening our results.

CONCLUSION

The burden of menstrual problems was high among young women (15-24 years) in rural Haryana, and heavy menstrual bleeding was associated with lesser strict use of sanitary pads.

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