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Original Research Article

Menstrual hygiene knowledge and practices among high school girls in urban central India: a cross-sectional study

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ABSTRACT

Background: Menstruation is a natural physiological process, yet many adolescent girls in India lack adequate knowledge and face challenges in managing menstrual hygiene. Inadequate menstrual hygiene practices can lead to reproductive tract infections (RTIs) and other health issues. This study aimed to explore menstrual hygiene knowledge and practices among high school girls in urban central India, contributing to the understanding of current status of menstrual hygiene management in this region.

Methods: A school-based cross-sectional study was conducted among 1160 high school girls (grades 9th to 12th) in three government schools in an urban region of central India. The participants were surveyed using a self-administered questionnaire assessing their knowledge and practices related to menstruation and menstrual hygiene. Data were analyzed using descriptive statistics and logistic regression to identify predictors of menstrual knowledge and hygiene practices.

Results: Of the 1160 participants, 52.5% exhibited good knowledge, while 42.1% demonstrated good menstrual hygiene practices. The majority (96.4%) used sanitary pads, but 35.9% did not change them at least three times a day, exposing them to potential health risks. Factors influencing good menstrual knowledge and hygiene practices included maternal education, age, family income and grade level.

Conclusions: Despite a relatively high level of awareness about menstruation and hygiene, significant gaps remain in understanding menstrual biology and practicing optimal hygiene. Socio-economic factors and parental education play a critical role in improving menstrual hygiene knowledge and practices among adolescent girls.

Keywords: Adolescent girls, Knowledge and practices, Menstrual hygiene, SDG 3

INTRODUCTION

Adolescence, defined by the World Health Organization (WHO) as the period from 10 to 19 years of age, marks a crucial phase in a young person's development. One of the most significant milestones during this period is menarche, which signifies the beginning of a girl's reproductive phase.[1] On an average, menarche occurs between the ages of 12 and 13 globally.[2,3] However, in many low and middle-income countries (LMICs), including India, many adolescent girls lack proper education about menstruation, leaving them unprepared for this natural process.[4] Cultural taboos and discomfort around discussing menstruation, particularly within families and schools, perpetuate myths and misconceptions, hindering proper knowledge and support.

Addressing menstrual health is also aligned with the sustainable development goals (SDGs), particularly SDG 3 (good health and well-being) and SDG 4 (quality

education).[5] SDG 3 aims to ensure healthy lives and promote well-being for all, including addressing the specific health needs of women and girls. SDG 4 seeks to ensure inclusive and equitable education and promote lifelong learning opportunities for all, which includes providing girls with the necessary knowledge to manage their menstrual health effectively. Furthermore, SDG 6 (clean water and sanitation) underscores the importance of sanitation and hygiene practices, which are vital for menstrual health and well-being.

Menstrual hygiene management (MHM) is essential for maintaining health during menstruation. Poor hygiene practices can lead to reproductive tract infections (RTIs), which have serious health consequences, including chronic pain and infertility.[6,7] Despite the importance of menstrual hygiene, it remains a neglected issue, with many adolescent girls in India experiencing significant challenges in managing menstruation. Approximately 64% of adolescent girls in India face menstrual-related problems, and inadequate access to sanitary products and cultural taboos hinder school attendance, particularly for the 68 million girls enrolled in school.[8-10]

Studies show varying levels of knowledge and practices regarding menstrual hygiene. In urban Mysuru, 78.4% of girls demonstrated good knowledge and 96.4% practiced proper hygiene, whereas in rural Bihar, 59.3% had good knowledge but only 50.3% followed good hygiene practices.[11,12] These disparities highlight the need for targeted interventions to improve menstrual hygiene education and access to products, especially in rural and underserved areas.

Recognizing the importance of menstrual health, the Government of India introduced initiatives like subsidized sanitary napkin schemes for rural girls in 2011 and observes menstrual hygiene day on May 28 to raise awareness. Despite these efforts, many adolescent girls remain uninformed, leading to inadequate menstrual hygiene management and adverse health outcomes.[13,14]

This study aimed to explore knowledge and practices of menstrual hygiene among high school girls in urban region of central India, to provide valuable insights into the current status of menstrual hygiene management in this region. The findings will contribute to a broader understanding of the gaps in menstrual health education and factors influencing menstrual hygiene practices, which can inform future interventions and policies aimed at improving menstrual health outcomes for adolescent girls in India.

METHODS

A school-based cross-sectional study was conducted between November 2024 to March 2025, among high school girls in grades 9th to 12th across three government schools in an urban region of central India. Of the total 1259 girl students enrolled in these schools, 1160 participated in the study. Only girls who had attained menarche were included, while those who were critically ill or unwilling to participate were excluded.

The sample size was calculated using formula for estimating single population proportion with 95% confidence interval, 5% margin of error, 78.4% prevalence of knowledge regarding menstruation, and design effect of 2.[10] To account for the non-response rate, an additional 10% was added to the calculated sample size of 522, resulting in a final sample size of 574. Though the calculated sample size was 574, but to increase the study's power, all 1160 girls who were willing to participate were included.

The student's menstrual knowledge score was calculated based on seven knowledge-specific questions, with each correct response earning one point (Table 2). Incorrect or 'don't know' responses received no points. The total knowledge score ranged from 0 to 7, with a mean score of 5.23, which was used to determine the cutoffs i.e. 5 for ranking. Respondents scoring 6-7 points were classified as having 'good knowledge' of menstruation and menstrual hygiene, while those scoring 0-5 points were classified as having 'poor knowledge'.

The student's menstrual hygiene practice score was calculated based on practice-specific questions (Table 4). Each correct response earned one point, with incorrect or 'don't know' responses receiving no points. The total practice score ranged from 0 to 8, with a mean score of 6.1, which was used to determine the cutoffs i.e. 6 for ranking. Respondents scoring 7-8 points were classified as having 'good practice of menstrual hygiene', while those scoring 0-6 points were classified as having 'poor practice of menstrual hygiene'.

Data was collected through self-administered questionnaires, adapted and modified from previous literature.[15-22] The questionnaire was prepared in English, as all participants were enrolled in English medium schools and were proficient in the language. The principal investigators explained the study's objectives, ensured confidentiality and obtained informed consent from all participants. After distributing the questionnaires, investigators explained each question in detail, allowing the participants to answer only after clarification. Once the survey was completed, a lecture on menstrual hygiene and good MHM practices was provided.

Completed questionnaires were coded and entered into Microsoft Excel 2021, followed by analysis in SPSS Windows version 26. Descriptive statistics such as proportions, percentages and frequency distributions were used. Bivariate analysis assessed the relationship between knowledge and practice of menstrual hygiene and socio-demographic variables. Variables found to be significant (p value <0.05) in bivariate analysis were included in multivariate analysis using logistic regression to adjust for potential confounders.

Ethical clearance was obtained, and confidentiality of data was maintained. Written informed consent was taken from participants and for participants under the age of consent, parental consent was obtained along with the assent.

RESULTS

The study included 1160 adolescent girls, with a mean age of 15.2 years (SD=1.3). The majority of participants were Hindu (95.4%) and most fathers (91.5%) were employed in government jobs, while 92.9% of mothers were homemakers. A significant proportion of fathers (45.3%) and mothers (41.0%) had completed at least a degree or higher education. Additionally, 69.6% of families reported a monthly income of over ₹50,000, indicating a relatively higher socio-economic status (Table 1).

Table 1: Socio-demographic characteristics of study participants (n=1160).

Variables	N (%)
Age category (in years)	
<15	718 (61.9)
>15	442 (38.1)
Grade	
9th	336 (29.0)
10th	356 (30.7)
11th	233 (20.1)
12th	235 (20.2)
Religion	
Hindu	1106 (95.4)
Muslim	34 (2.9)
Sikh	13 (1.1)
Christian	5 (0.4)
Others	2 (0.2)
Living status of student	
With mother and father	825 (71.1)
With mother only	306 (26.4)
With father only	9 (0.8)
With relatives	16 (1.4)
Alone	3 (0.2)
With friends	1 (0.1)
Educational status of father	
Illiterate (cannot read and write)	1 (0.1)
Literate (able to read and write)	26 (2.3)
Up to 4th grade	5 (0.4)
Up to 10th grade	70 (6.0)
Up to 12th grade	399 (34.4)
Diploma	133 (11.5)
Degree holder or higher education	526 (45.3)
Educational status of mother	
Illiterate (cannot read and write)	8 (0.7)
Literate (able to read and write)	51 (4.4)
Up to 4th grade	10 (0.9)
Up to 10th grade	118 (10.2)
Up to 12th grade	387 (33.3)
Diploma	110 (9.5)
Degree holder or higher education	476 (41.0)
Occupation of father	
Daily laborer	1 (0.1)
Farmer	1 (0.1)
Government employee	1062 (91.5)
Merchant/trade/ shop owner	16 (1.4)

Continued.

Variables	N (%)
Private organization employee	63 (5.4)
Unemployed	1 (0.1)
Others	16 (1.4)
Occupation of mother	
Farmer	1 (0.1)
Government employee	26 (2.3)
Housewife	1078 (92.9)
Merchant/Trade/ shop owner	6 (0.5)
Private organization employee	33 (2.8)
Others	16 (1.4)
Gets pocket money from parents	
Yes	187 (16.1)
No	973 (83.9)
Have TV/Radio at home	
Yes	1101 (94.9)
No	59 (5.1)
Monthly income of family (INR)	
≤50000	353 (30.4)
>50000	807 (69.6)

Table 2: Knowledge about menstruation and menstrual hygiene (n=1160).

Variables	Number (%)
Menstruation	
Physiological process	912 (78.6)
Pathological process	49 (4.2)
Curse from God	20 (1.7)
Don't know	179 (15.5)
Cause of menstruation	
Hormones	978 (84.3)
Curse from God	28 (2.4)
Don't know	154 (13.3)
Source of menstrual blood	
Uterus	501 (43.2)
Vagina	604 (52.1)
Bladder	11 (1.0)
Abdomen	4 (0.3)
Don't know	40 (3.4)
Heard about menstruation before menarche	
Yes	1107 (95.4)
No	53 (4.6)
Knew about menstrual hygiene	
Yes	939 (80.9)
No	221 (19.1)
Knew about foul smell during menstruation	
Yes	810 (69.8)
No	350 (30.2)
Knew menstrual blood is unhygienic	
Yes	829 (71.5)
No	331 (28.5)
Knowledge (summary index)	
Good knowledge	609 (52.5)
Poor knowledge	551 (47.5)

Table 3: Predictors of knowledge about menstruation and menstrual hygiene among high school girls (n=1160).

Characteristics	Knowledge		Crude OR (95% CI)	Adjusted OR (95% CI)
	Good n (%)	Poor n (%)		
Class of student				
9th and 10th	320 (46.2)	372 (53.8)	1	1
11th and 12th	289 (61.8)	179 (38.2)	1.88 (1.48-2.38)	2.61 (1.70-4.00)
Age of students (in years)				
≤15	352 (49.0)	366 (51.0)	1	1
>15	257 (58.1)	185 (41.9)	1.44 (1.14-1.83)	0.65 (0.42-1.01)
Educational status of mother				
Upto 12th class	257 (44.8)	317 (55.2)	1	1
Above 12th class	352 (60.1)	234 (39.9)	1.86 (1.47-2.34)	1.81 (1.39-2.36)
Educational status of father				
Upto 12th class	236 (47.1)	265 (52.9)	1	1
Above 12th class	373 (56.6)	286 (43.4)	1.46 (1.16-1.85)	1.12 (0.87-1.47)
Occupation of father				
Others	37 (37.8)	61 (62.2)	1	1
Government employed	572 (53.9)	490 (46.1)	1.93 (1.26-2.94)	2.05 (1.33-3.18)

Table 4: Menstrual hygiene practices among study participants (n=1160).

Parameters of Practice	Number (%)
Uses absorbent materials during menstruation	1144 (98.6)
Uses commercially made sanitary pads as absorbent material	1118 (96.4)
Changes pads or clothes more than three times during menstruation	744 (64.1)
Dispose used sanitary pads in the dustbin	992 (85.5)
Uses paper to dispose of pads by wrapping	698 (60.2)
Takes bath daily during menstruation	1049 (90.4)
Cleans external genitalia during menstruation	1131 (97.5)
Cleans external genitalia with water and soap during menstruation	293 (25.3)
Practice (summary index)	
Good practice	488 (42.1)
Poor practice	672 (57.9)

The study results showed that 609 (52.5%) participants had good knowledge, while 551 (47.5%) had poor knowledge of menstruation and menstrual hygiene. 912 (78.6%) of the participants recognized menstruation as a natural physiological process and 978 (84.3%) were aware of the hormonal causes behind it. However, only 501 (43.2%) of participants correctly identified uterus as the source of menstrual blood, which suggests knowledge gap regarding the biological mechanisms of menstruation. Despite this, a large proportion of girls 939 (80.9%) acknowledged the importance of menstrual hygiene, indicating that they understood the health risks associated with poor hygiene practices (Table 2).

The study also revealed that 70.3% of respondents primarily received information about menstruation and menstrual hygiene from their mothers. Other sources of information about menstruation and menstrual hygiene included teachers, friends, mass media and books, as shown in Figure 1.

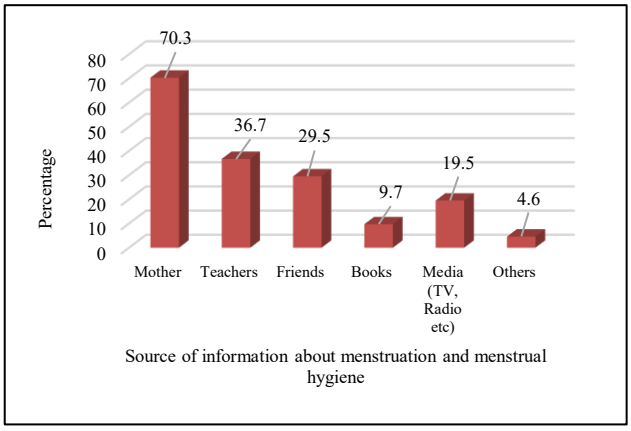

Figure 1: Source of information about menstruation and menstrual hygiene.

The study found that girls whose mothers had at least a secondary school education were 1.86 times more likely to have good knowledge of menstruation and menstrual hygiene compared to those whose mothers had lower

education levels (95% CI: 1.47-2.34). Additionally, girls studying in 11th and 12th standards were 1.88 times more likely (95% CI: 1.48-2.38) to possess good knowledge. Older girls, those above 15 years, had a higher likelihood (OR=1.44, 95% CI: 1.14-1.83) of having good knowledge compared to younger girls. Girls whose fathers were government employees also had better knowledge, with an odds ratio of 1.93 (95% CI: 1.26-2.94) compared to those whose fathers had other occupations (Table 3).

The study also evaluated menstrual hygiene practices with 488 (42.1%) of participants demonstrated good menstrual hygiene practices, while 672 (57.9%) had poor practices (Table 4). A large majority (96.4%) of girls reported using sanitary pads, which suggests that sanitary pads are the most commonly used menstrual product in this population. However, while 64.1% of participants changed their pads at least three times a day, 35.9% did not adhere to the recommended hygiene practices, which could expose them to the risk of infections. Concerning genital hygiene, 25.3% of girls used both soap and water for cleaning, while the majority relied on water alone, highlighting the need for improved hygiene practices. Most participants (90.4%) bathed daily during menstruation, which is a positive health practice.

The logistic regression analysis revealed that girls whose mothers (OR=2.46, 95% CI: 1.94-3.13) and fathers (OR=1.84, 95% CI: 1.45-2.34) had at least secondary school education were likely to practice good menstrual hygiene compared to those whose parents had lower education levels. On the other hand, respondents from 11th and 12th classes (OR=2.09, 95% CI: 1.65-2.66) and those older than 15 years (OR=2.06, 95% CI: 1.61-2.62), were more likely to have good menstrual hygiene practices than girls from 9th and 10th classes and those aged 15 years or younger. Additionally, girls living with both parents were more likely to practice good menstrual hygiene (OR=1.40, 95% CI: 1.07-1.80) compared to those living with others (Table 5).

Table 5: Predictors of practice about menstruation and menstrual hygiene among high school girls (n=1160).

Characteristics	Practice		Crude OR (95% CI)	Adjusted OR (95% CI)
	Good N (%)	Poor N (%)		
Class of students				
9th and 10th	241 (34.8)	451 (65.2)	1	1
11th and 12th	247 (52.8)	221 (47.2)	2.09 (1.65-2.66)	1.55 (1.2-2.34)
Age of students (in years)				
≤15	254 (35.4)	464 (64.6)	1	1
>15	234 (52.9)	208 (47.1)	2.06 (1.61-2.62)	1.46 (0.96-2.22)
Living status of the student				
Living with other	122 (36.4)	213 (63.6)	1	1
Living with mother and father	366 (44.4)	459 (55.6)	1.40 (1.07-1.80)	1.31 (0.99-1.72)
Educational status of mother				
Upto 12th class	179 (31.2)	395 68.8)	1	1
Above 12th class	309 (52.7)	277 (47.3)	2.46 (1.94-3.13)	2.27 (1.74-2.97)
Educational status of father				
Upto 12th class	169 (33.7)	332 (66.3)	1	1
Above 12th class	319 (48.4)	340 (51.6)	1.84 (1.45-2.34)	1.25 (0.96-1.64)

DISCUSSION

This study assessed the knowledge and practices related to menstrual hygiene among high school girls in an urban region of central India. The findings highlight several critical aspects related to menstrual knowledge, hygiene practices and socio-demographic factors influencing these aspects.

The results of this study align with previous research that shows substantial gaps in menstrual hygiene knowledge, even among adolescents in urban areas. While 78.6% of the participants recognized menstruation as a physiological process, only 43.2% accurately identified the uterus as the source of menstrual blood. This suggests that while most adolescents understand menstruation as a physiological process, there is a considerable gap in understanding the biological mechanisms behind it. Similar findings were observed in studies conducted in rural India and central Ethiopia, where gaps in the understanding of the biological mechanisms of menstruation were prevalent. The study conducted by Singh in rural India also reported that only 60% of participants could identify uterus as the source of menstrual blood, highlighting the widespread gap in biological knowledge.[23,24]

Interestingly, 84.3% of participants were aware of the hormonal causes behind menstruation. This growing awareness reflects the increasing exposure to education and media, as also highlighted in previous studies. For instance, Patel et al study, emphasized the role of media

and education campaigns in improving menstrual health awareness.[25] Similarly, other studies have suggested that a combination of education and media exposure is essential to improving the overall understanding of menstrual health.[25,26]

Mothers were identified as the primary source of menstrual education, with 70.3% of girls reporting receiving information from their mothers. This finding is consistent with study conducted by Omidvar in India, which has pointed to the central role of mothers in educating their daughters about menstruation.[27] However, as noted in studies by Bulto and Omidvar, lack of comprehensive school-based education and limited access to health professionals or teachers often leads to perpetuation of myths and misconceptions surrounding menstruation.[24,27] These gaps in menstrual education highlight the need for a more formalized curriculum that addresses menstruation in a comprehensive and fact-based manner, as suggested by several researchers.[23,24]

Socio-economic factors, particularly maternal education, were significant predictors of both menstrual knowledge and hygiene practices. Girls whose mothers had at least secondary school education were more likely to have better knowledge and practices concerning menstruation. This is in line with findings by Majeed study, that reported that maternal education plays a key role in improving menstrual health outcomes.[26] Similarly, in rural and semi-urban settings, better socio-economic conditions have been shown to improve availability of sanitary products and facilitate better menstrual hygiene practices.[23,28]

Regarding menstrual hygiene practices, 42.1% of participants demonstrated good hygiene practices, with 96.4% using sanitary pads as the absorbent material. The use of sanitary pads is significantly higher compared to rural areas, where cloth is more commonly used.[29] However, while majority of girls used sanitary pads, 35.9% of them did not change their pads at least three times a day, exposing them to the risk of reproductive tract infections (RTIs).[23] This finding supports the concerns highlighted by Nabwera et al, that found that infrequent pad changes were associated with an increased risk of RTIs, particularly among adolescent girls in rural regions.[30] Additionally, study by Arumugam highlighted that while sanitary pads are commonly used, hygienic practices related to their usage often remain suboptimal.[29]

Studies by Yadav and Sowmya similarly reported that while the use of sanitary products was widespread, improper hygiene practices, such as infrequent changing of pads, remained a significant concern.[28,31] These findings reinforce the need for targeted interventions to not only increase the availability and use of sanitary products but also to promote proper hygiene practices, as suggested by Van Eijk et al study, that recommended education about hygiene along with access to menstrual products as an essential measure for improving menstrual health outcomes.[32]

Additionally, socio-demographic factors such as socio-economic status and parental education were significant predictors of menstrual knowledge and hygiene practices. Girls from higher socio-economic backgrounds, particularly those whose parents had higher education levels, demonstrated better menstrual hygiene practices and knowledge.[31] This aligns with the findings of studies by Parasuraman, Nabwera and Singh, which highlighted the influence of socio-economic factors on menstrual health outcomes.[23,30,33] Furthermore, research by Van Eijk et al, suggest that girls from more affluent families have greater access to resources, including menstrual products and health education, which contributes to better hygiene practices.[32]

Older girls (above 15 years) were more likely to have better menstrual hygiene knowledge and practices. This could be attributed to the fact that older adolescents are more likely to have experienced menstruation for a longer period, giving them more experience in managing it. This finding is consistent with study conducted by Sowmya, where older girls reported greater confidence and competence in managing menstruation.[31] Moreover, girls whose fathers were government employees had better menstrual hygiene knowledge, which may be attributed to the higher socio-economic status and greater access to resources in families with government employees.[33]

The limitations of this study are that it focuses on urban population, which may limit generalizability of the findings to rural or semi-urban areas where menstrual hygiene challenges could be more significant. Additionally, reliance on self-reported data may introduce biases, such as social desirability or recall bias. Finally, cross-sectional design prevents establishment of causal relationships between socio-demographic factors and menstrual hygiene practices.

CONCLUSION

This study highlights significant gaps in knowledge and practices related to menstrual hygiene among high school girls in urban India. While a majority of girls were aware of the basic aspects of menstruation, knowledge about biological processes behind it was limited. Furthermore, despite high levels of sanitary pads use, many girls did not follow optimal hygiene practices, which could put them at risk of health complications. The study also demonstrates that socio-demographic factors, including parental education and socio-economic status, play a crucial role in shaping menstrual health knowledge and practices.

The findings from current study underscores the need for targeted interventions to improve menstrual health education, focusing not only on the biological aspects of menstruation but also on promoting proper hygiene

practices. School-based programmes, community outreach and parental involvement are essential for ensuring that adolescent girls in India have the knowledge and resources they need to manage menstruation safely and hygienically.

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