International Journal of Medicine
ISSN (P): 1468-3814; ISSN (e): 2667-7008
https://www.theinternationalmedicine.com
Volume: 6(1) 2024

Original Research

Evaluation of Menstrual Hygiene Practices and Associated Reproductive Tract Symptoms among Adolescent Girls: A Cross-Sectional Observational Study.

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Received: 08 Nov 2024 / Accepted: 05 Dec 2024

Abstract
Background: Menstrual hygiene is an essential component of adolescent health, yet inadequate practices remain common because of limited awareness, sociocultural barriers, poor sanitation access, and restricted privacy. Poor menstrual hygiene contributes to discomfort, school absenteeism, and symptoms suggestive of reproductive tract morbidity. *Objectives:* To evaluate menstrual hygiene practices among adolescent girls and to assess their association with self-reported reproductive tract symptoms. *Methods:* This cross-sectional observational study was conducted among 100 adolescent girls at Chamarajanagar Institute of Medical Sciences, Chamaraja Nagar, Karnataka, India, from October 2023 to September 2024. Menstruating girls aged 10-19 years were included. Data on sociodemographic characteristics, menstrual profile, hygiene practices, source of menstrual information, disposal practices, and reproductive tract symptoms were collected using a structured questionnaire. Descriptive statistics and chi-square test were used for analysis. *Results:* The mean age of participants was 15.4 ± 1.8 years, and the mean age at menarche was 12.8 ± 1.1 years. Sanitary pads were used exclusively by 72% of girls, while 18% used cloth and 10% used both cloth and sanitary pads. Overall, 64% had adequate menstrual hygiene practices. Reproductive tract symptoms were reported by 38% of girls, most commonly abnormal vaginal discharge, lower abdominal pain, and genital itching. Symptoms were significantly more frequent among girls with inadequate hygiene practices, cloth or mixed absorbent use, infrequent absorbent change, and unsatisfactory genital hygiene. *Conclusion:* Most adolescent girls used sanitary pads, but gaps persisted in hygiene, disposal, and symptom awareness. Inadequate menstrual hygiene practices were significantly associated with reproductive tract symptoms, supporting the need for structured school- and hospital-based menstrual health education.

Keywords: *Adolescent girls; menstrual hygiene; reproductive tract symptoms; sanitary pads; school health; cross-sectional study.*

Introduction

Menstruation is a normal biological event that marks reproductive maturity, but for many adolescent girls it is accompanied by silence, fear, misinformation, and restrictive practices. Adolescence is a sensitive developmental period in which menstrual knowledge, hygienic behaviour, and access to safe absorbents shape both health and educational participation. In India, menstrual health is further influenced by family communication, school environment, affordability of products, cultural taboos, and availability of water, sanitation, and privacy [1,2]. A systematic review from India highlighted that menstrual hygiene management among adolescent girls remains uneven across regions, especially between urban, rural, and socioeconomically disadvantaged populations [2].

Menstrual hygiene involves the use of clean absorbent material, adequate frequency of change, washing of external genitalia, hand hygiene, privacy during changing, and safe disposal of used absorbents. These practices are not only matters of comfort and dignity but also linked with prevention of odour, skin irritation, urogenital symptoms, and reproductive tract morbidity. Reviews on menstrual hygiene management and waste disposal have emphasized that access to menstrual products alone is insufficient when disposal systems, sanitation facilities, privacy, and health education remain weak [4,5]. National and community-based studies have also shown that educational status, socioeconomic factors, media exposure, and household environment influence the use of hygienic absorbents among adolescent girls and young women [3,6].

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DOI: 10.61336/im/24-01-25

The biofilm production retards the antimicrobial therapy against bacteria because the biofilm develops a barrier which reduces the drug Poor menstrual hygiene practices are associated with several self-reported reproductive and urogenital symptoms, including abnormal vaginal discharge, itching, foul smell, lower abdominal pain, and burning micturition. A large Indian analysis reported a positive relationship between non-use of hygienic menstrual methods and reproductive tract infection symptoms as well as abnormal vaginal discharge [11]. Similarly, research from Odisha documented the importance of water, sanitation, and menstrual hygiene practices in relation to urogenital infection risk [12]. Among adolescent girls, school-based studies from different Indian settings have reported variable use of sanitary pads, inconsistent genital hygiene, restrictions during menstruation, and hesitancy in seeking care for menstrual or reproductive symptoms [1,7-10].

Adolescent girls often receive menstrual information from mothers, teachers, friends, or media, but the accuracy and completeness of this information differ widely. When menstruation is discussed only after menarche or within restrictive cultural boundaries, girls develop practices through trial and error. This creates an avoidable gap between awareness and safe practice. Therefore, local evidence is important for designing focused counselling strategies in schools, adolescent clinics, and community health programmes. The present study was conducted with the objective of evaluating menstrual hygiene practices among adolescent girls and assessing the association between these practices and self-reported reproductive tract symptoms at Chamarajanagar Institute of Medical Sciences, Chamaraja Nagar, Karnataka, India.

METHODOLOGY

Study design and setting

This cross-sectional observational study was conducted at Chamarajanagar Institute of Medical Sciences, Chamaraja Nagar, Karnataka, India. The study period extended from October 2023 to September 2024. The institute provides clinical services, teaching, and community-oriented health care, and adolescent girls attending clinical or outreach-related settings were considered for enrolment according to eligibility criteria.

Study population and eligibility criteria

The study included 100 adolescent girls aged 10-19 years who had attained menarche and were willing to participate. Girls who had not attained menarche, those with severe acute illness at the time of interview, those unable to provide reliable information, and those who declined participation were excluded. Participation was voluntary, and privacy was maintained during the interview process. For younger adolescents, assent and guardian permission were considered as applicable according to institutional requirements.

Data collection tool and study variables

Data were collected using a predesigned, structured questionnaire prepared after reviewing published literature on menstrual hygiene and adolescent reproductive morbidity [1,2,7,8,10]. The questionnaire included age, residence, educational status, age at menarche, menstrual cycle pattern, type of absorbent used, frequency of absorbent change, washing of external genitalia, handwashing before and after absorbent change, availability of private toilet facility, method of disposal, source of menstrual information, and reproductive tract symptoms. Reproductive tract symptoms were recorded as self-reported symptoms such as abnormal vaginal discharge, lower abdominal pain, genital itching or irritation, foul-smelling discharge, and burning micturition. Dysmenorrhea affecting routine activity and school absenteeism during menstruation were also documented.

Operational definition

Menstrual hygiene practice was classified as adequate when the participant reported use of sanitary pads or clean absorbents, changing absorbents at least three times per day, satisfactory washing of external genitalia during menstruation, handwashing before and after absorbent change, and safe disposal of used absorbents. Participants with multiple deficiencies in these domains were grouped under inadequate menstrual hygiene practice. Reproductive tract symptoms were considered present when a participant reported at least one of the selected symptoms during recent menstrual cycles or the preceding few months.

Statistical analysis

Data were entered and analysed using descriptive and inferential statistics. Continuous variables were summarized as mean and standard deviation. Categorical variables were expressed as frequencies and percentages. Association between menstrual hygiene practices and reproductive tract symptoms was assessed using the chi-square test. A p-value less than 0.05 was considered statistically significant. The findings are presented through text and tables with internally consistent denominators based on a total sample size of 100 participants.

Ethical considerations

The study was conducted after obtaining institutional permission and following ethical principles for research involving adolescent participants. Confidentiality was maintained by avoiding personal identifiers in the analysis. Participants were informed about the purpose of the study, and girls reporting significant symptoms were advised to seek appropriate clinical evaluation.

Results

A total of 100 adolescent girls were included in the study. The mean age of the participants was 15.4 ± 1.8 years. Most participants belonged to the 14-16 years age group. The mean age at menarche was 12.8 ± 1.1 years. Regular menstrual cycles were reported by 68% of girls, while 32% reported irregular cycles. The baseline demographic and menstrual profile is shown in Table 1.

Table 1. Baseline demographic and menstrual profile of adolescent girls

Variable	Number of girls	Percentage
Age group		
10-13 years	18	18.0%
14-16 years	52	52.0%
17-19 years	30	30.0%
Residence		
Rural	58	58.0%
Urban	42	42.0%
Educational status		
Middle school	28	28.0%
High school	49	49.0%
Intermediate/college	23	23.0%
Age at menarche		
<12 years	12	12.0%
12-14 years	76	76.0%
>14 years	12	12.0%
Menstrual cycle pattern		
Regular	68	68.0%
Irregular	32	32.0%

Sanitary pads were used by 72% of participants, while 18% used cloth and 10% used both cloth and sanitary pads. Absorbent change three

or more times per day was reported by 76% of girls. Proper handwashing before and after changing absorbents was practiced by 71%. Private toilet facility at home was available for 69% of participants. Menstrual hygiene practices are presented in Table 2.

Table 2. Menstrual hygiene practices among adolescent girls

Practice	Number of girls	Percentage
Type of absorbent used		
Sanitary pad only	72	72.0%
Cloth only	18	18.0%
Both cloth and sanitary pad	10	10.0%
Frequency of absorbent change		
≥3 times/day	76	76.0%
<3 times/day	24	24.0%
Washing of external genitalia during menstruation		
Satisfactory	73	73.0%
Unsatisfactory	27	27.0%
Handwashing before and after absorbent change		
Yes	71	71.0%
No	29	29.0%
Private toilet facility at home		
Present	69	69.0%
Absent	31	31.0%
Method of disposal		
Wrapped and disposed in dustbin	61	61.0%
Burning/burying	24	24.0%
Open disposal	15	15.0%

The most common source of information regarding menstruation was the mother, reported by 46% of participants, followed by teachers in 24%, friends in 18%, and media or health workers in 12%. Overall, 64% of girls had adequate menstrual hygiene practices, while 36% had inadequate practices. These findings are summarized in Table 3.

Table 3. Source of menstrual hygiene information and overall practice status

Variable	Number of girls	Percentage
Source of information		
Mother	46	46.0%
Teacher	24	24.0%
Friends	18	18.0%
Media/health worker	12	12.0%
Overall menstrual hygiene practice		
Adequate	64	64.0%
Inadequate	36	36.0%

Reproductive tract symptoms were reported by 38% of adolescent girls. The most frequent symptom was abnormal vaginal discharge, observed in 24%, followed by lower abdominal pain in 21%, itching or irritation in 18%, foul-smelling discharge in 11%, and burning micturition in 9%. Pain during menstruation affecting routine activity was reported by 32%, and school absenteeism during menstruation was reported by 27%. Symptom distribution is shown in Table 4.

Table 4. Reproductive tract symptoms reported by adolescent girls

Symptom	Number of girls	Percentage
Any reproductive tract symptom	38	38.0%
Abnormal vaginal discharge	24	24.0%
Lower abdominal pain	21	21.0%
Genital itching/irritation	18	18.0%
Foul-smelling discharge	11	11.0%
Burning micturition	9	9.0%
Pain during menstruation affecting routine activity	32	32.0%
School absenteeism during menstruation	27	27.0%

Reproductive tract symptoms were more common among girls with inadequate menstrual hygiene practices. Symptoms were present in 61.1% of girls with inadequate hygiene compared with 25.0% of girls with adequate hygiene, and this association was statistically significant. Use of cloth or mixed absorbents, changing absorbents less than three times per day, and unsatisfactory genital hygiene were also significantly associated with reproductive tract symptoms. The association analysis is presented in Table 5.

Table 5. Association between menstrual hygiene practices and reproductive tract symptoms

Variable	Total	RT symptoms present	RT symptoms absent	p-value
Overall hygiene practice				
Adequate	64	16 (25.0%)	48 (75.0%)	0.001
Inadequate	36	22 (61.1%)	14 (38.9%)	
Type of absorbent				
Sanitary pad only	72	20 (27.8%)	52 (72.2%)	0.002
Cloth/both	28	18 (64.3%)	10 (35.7%)	
Frequency of absorbent change				
≥3 times/day	76	22 (28.9%)	54 (71.1%)	0.002
<3 times/day	24	16 (66.7%)	8 (33.3%)	
Genital hygiene				
Satisfactory	73	21 (28.8%)	52 (71.2%)	0.004
Unsatisfactory	27	17 (63.0%)	10 (37.0%)	

Overall, the findings indicate that although most adolescent girls used sanitary pads and reported acceptable hygiene practices, more than one-third had reproductive tract symptoms. Inadequate menstrual hygiene, cloth use, infrequent absorbent change, and poor genital hygiene showed a significant relationship with reproductive tract symptoms among adolescent girls.

Discussion

The present study evaluated menstrual hygiene practices and self-reported reproductive tract symptoms among 100 adolescent girls in a tertiary-care institutional setting in Karnataka. The mean age of participants was 15.4 years, and the mean age at menarche was 12.8 years. These values are comparable with Indian school-based studies in which menarche occurred around 12-13 years [1,7,9]. Menstrual cycle regularity was reported by nearly two-thirds of participants, reflecting the expected variability during adolescence.

Sanitary pad use was reported by 72% of girls. This is close to the findings of Borkar et al., who reported sanitary pad use among 73.79% of tribal adolescent girls, and Boruah et al., who reported sanitary pad use among 74.12% of adolescent girls in Assam [7,8]. Mathiyalagen et al. reported exclusive sanitary pad use in 78.1% of school girls in Puducherry [1]. These findings indicate that access to sanitary pads is improving; however, cloth or mixed absorbent use among 28% of participants shows that affordability, family practice, comfort, and availability continue to influence menstrual product choice. National-level evidence also demonstrates wide regional and socioeconomic differences in hygienic method use among adolescent women in rural India [6].

Adequate menstrual hygiene practices were observed in 64% of girls. This proportion requires cautious interpretation because safe menstruation depends on several behaviours, not absorbent choice alone. In the present study, 24% changed absorbents less than three times per day, 27% reported unsatisfactory genital hygiene, 29% did not practice proper handwashing, and 15% practiced open disposal. Reviews on menstrual hygiene and waste disposal emphasize that privacy, water access, disposal mechanisms, and behavioural education are essential components of menstrual health [4,5]. The mother was the leading source of menstrual information, but the role of teachers and health workers needs strengthening for accurate premenarchal guidance.

Reproductive tract symptoms were reported by 38% of girls, with abnormal vaginal discharge, lower abdominal pain, and genital itching being the leading complaints. A significant association was observed between symptoms and inadequate hygiene practices. Girls using cloth or mixed absorbents, those changing absorbents less frequently, and those with unsatisfactory genital hygiene had higher symptom proportions. These observations are supported by previous evidence linking unhygienic menstrual methods with reproductive tract infection symptoms and abnormal vaginal discharge [11]. The Odisha study also highlighted the role of WASH access and menstrual hygiene in urogenital infection risk [12]. Similar adolescent-focused research from Gambia connected menstrual hygiene management with broader health outcomes, including urogenital symptoms and psychosocial distress [14].

School absenteeism during menstruation was reported by 27% of girls. Absenteeism reflects the combined effect of pain, inadequate facilities, fear of staining, poor disposal options, and embarrassment. Tegegne and Sisay reported the relationship between menstrual hygiene management and school absenteeism among adolescent girls [13]. The present study supports integrated menstrual health education, availability of safe absorbents, clean toilets, disposal bins, and early counselling for girls reporting reproductive symptoms.

Limitations

This study was conducted with a sample size of 100 girls from a single institution, limiting wider generalizability. Reproductive tract symptoms were self-reported and not confirmed through laboratory or clinical examination. Sensitive questions on menstruation are prone to recall and social desirability bias. The cross-sectional design identifies associations but does not establish temporal or causal relationships. The findings require confirmation through larger, multicentre analytic studies.

Conclusion

This cross-sectional observational study showed that most adolescent girls used sanitary pads and had adequate menstrual hygiene practices, but important gaps persisted in absorbent change, genital hygiene, handwashing, privacy, and disposal. More than one-third of participants reported reproductive tract symptoms, with abnormal vaginal discharge, lower abdominal pain, and genital itching being the common complaints. Inadequate hygiene practices, cloth or mixed absorbent use, infrequent absorbent change, and unsatisfactory genital hygiene were significantly associated with reproductive tract symptoms. Menstrual health education should begin before menarche and continue through schools, families, and adolescent health services. Strengthening sanitation and safe disposal facilities is equally essential for sustainable menstrual hygiene.

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