Annals of Medicine and Medical Sciences (AMMS)
Volume 04, 2025, *Page No.: 1164 to 1171*
Available at: *http://ammspub.com*

Original Article

OPEN ACCESS

Menstrual Hygiene Management Among Adolescent Girls: A Cross-Sectional Study of Practices, Perceptions, and Contextual Challenges in School Settings

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Abstract

Objective: To assess the prevalence and patterns of menstrual disorders and their impact on school attendance and daily activities among rural adolescent schoolgirls in South Andaman. ***Design:*** Community-based cross-sectional study. ***Subjects/Patients:*** A total of 288 adolescent schoolgirls from the Community Health Centre Bambooflat area, South Andaman, Andaman and Nicobar Islands. ***Methods:*** Sample size was calculated using prevalence of 75% with 5% allowable error. Data were collected using a pre-tested questionnaire and analysed appropriately. ***Results:*** The vast majority (98.9%) of participants were aware of menstruation before menarche, primarily learning from their mothers (69.1%), yet significant gaps in biological knowledge persisted. While commercial sanitary pad use was predominant (94.1%), key practices like infrequent changing and non-standard disposal methods were strongly associated with poor menstrual hygiene status. ***Conclusion:*** Menstrual disorders are a significant concern among adolescent girls, underscoring the need for early identification, awareness, and supportive school-based interventions.

Keywords: ***Adolescent; Cross-Sectional Studies; Menstruation Disturbances; Menstrual Hygiene Products; Prevalence; Schools; Students.***

Introduction

Menstruation is a natural biological process and a vital indicator of women's reproductive health, yet it continues to be surrounded by silence, stigma, and poor practices across much of the world. Despite being a universal experience for women and girls of reproductive age, the topic remains shrouded in cultural taboos, misinformation, and neglect in public discourse. Globally, around 1.8 billion women and girls menstruate every month, yet millions of them still lack access to safe menstrual products, adequate sanitation facilities, and supportive environments that would allow them to manage menstruation with dignity and without disruption to their daily lives[1].

In India, studies consistently reveal significant gaps in menstrual hygiene management (MHM). The National Family Health Survey-5 (NFHS-5) reported that only 64% of women aged 15-24 years use hygienic menstrual products, with stark differences between urban and rural areas and across different states [2]. These figures point to deep-rooted inequities in access, awareness, and affordability. Among the most vulnerable groups are school-going adolescent girls, many of whom experience menarche with little prior knowledge, poor access to sanitary absorbents, and inadequate school infrastructure. A landmark study by Dasgupta *et al* (2008) demonstrated that lack of proper menstrual hygiene often resulted in school absenteeism, psychosocial stress, and feelings of shame and embarrassment [3].

Evidence gathered from other countries highlight that these challenges are not unique to India but are global in nature. In sub-Saharan Africa, for example, more than 50% of schoolgirls lack adequate MHM facilities, including clean toilets and safe disposal options, contributing to frequent absenteeism and dropout from school [4]. In Nepal, a cross-sectional study found that 83% of adolescent girls faced restrictions during menstruation, including exclusion from kitchens, temples, and social gatherings, reflecting the profound influence of cultural norms and taboos on girls' lived experiences [5]. Similarly, in Ethiopia, only 39% of adolescent girls reported using sanitary pads, with many relying on old cloth or other unsafe alternatives due to affordability and availability constraints[6].

Cultural taboos and misconceptions exacerbate the problem. A systematic review of menstrual practices in low- and middle-income countries by Sumpter and Torondel (2013) revealed that restrictive beliefs and secrecy surrounding menstruation often translate into unsafe practices [7]. These include infrequent changing of absorbents, use of unhygienic materials, and restrictions in

Received: September 04, 2025; **Revised:** September 25, 2025; **Accepted:** September 29, 2025

mobility and participation in social and religious life. Such practices perpetuate not only physical health risks such as reproductive tract infections but also significant psychosocial burdens, including lowered self-esteem and academic underachievement [7].

The situation is further aggravated by poor school-level facilities. Research by Sommer *et al* (2015) showed that inadequate provision of clean water, separate toilets for girls, privacy for changing, and safe disposal mechanisms directly hinder effective MHM. The absence of these facilities has been closely linked to increased school absenteeism and, in some cases, permanent dropout, thereby undermining girls' right to education [8].

Given these global and national contexts, there is an urgent need to assess menstrual hygiene practices, perceptions, and contextual challenges in school environments, particularly in geographically unique and resource-constrained settings such as the Andaman and Nicobar Islands. This region, with its socio-cultural diversity and infrastructural limitations, remains underrepresented in MHM research. Understanding the experiences of adolescent girls in such settings is critical for designing interventions that are contextually relevant and sustainable.

This study therefore aims to bridge that gap by examining menstrual hygiene management among adolescent schoolgirls in the Andaman and Nicobar Islands, focusing on their practices, perceptions, and the challenges faced in managing menstruation within the school setting. By doing so, it seeks to generate evidence that can inform local interventions and contribute to the broader discourse on menstrual health equity.

Methods

Study Design and Setting

A community-based cross-sectional study was conducted in the catchment area of the Community Health Centre (CHC) Bambooflat, located in the South Andaman district of the Andaman and Nicobar Islands, India. The study area represents a semi-rural population with diverse socio-cultural backgrounds, making it a relevant setting to examine menstrual hygiene management (MHM) practices and related challenges among school-going adolescent girls.

Study Population

The study population included adolescent schoolgirls aged 10–19 years who were residing in the CHC Bambooflat area and had attained menarche. Girls who had not yet experienced menarche or who were unwilling to participate were excluded. Eligible participants were recruited from government and private schools within the study area, with the cooperation of school authorities.

The required sample size was calculated using the formula:

n=Z2×p×qe2n = \frac{Z^2 \times p \times q}{e^2}n=e2Z2×p×q

where Z is the standard normal deviate at 95% confidence level (1.96), p is the assumed prevalence of menstrual disorders (0.75) based on a prior study by Vani *et al*. (2013) [9], q = 1 – p, and e is the allowable error (5%). The calculated sample size was 288 adolescent girls.

A list of eligible schools within the CHC catchment area was prepared. Schools were selected proportionally, and participants were recruited using stratified random sampling to ensure representation across grades (middle, secondary, and higher secondary). Within each school, eligible girls were approached, and participation was voluntary after informed consent (**Figure-I**).

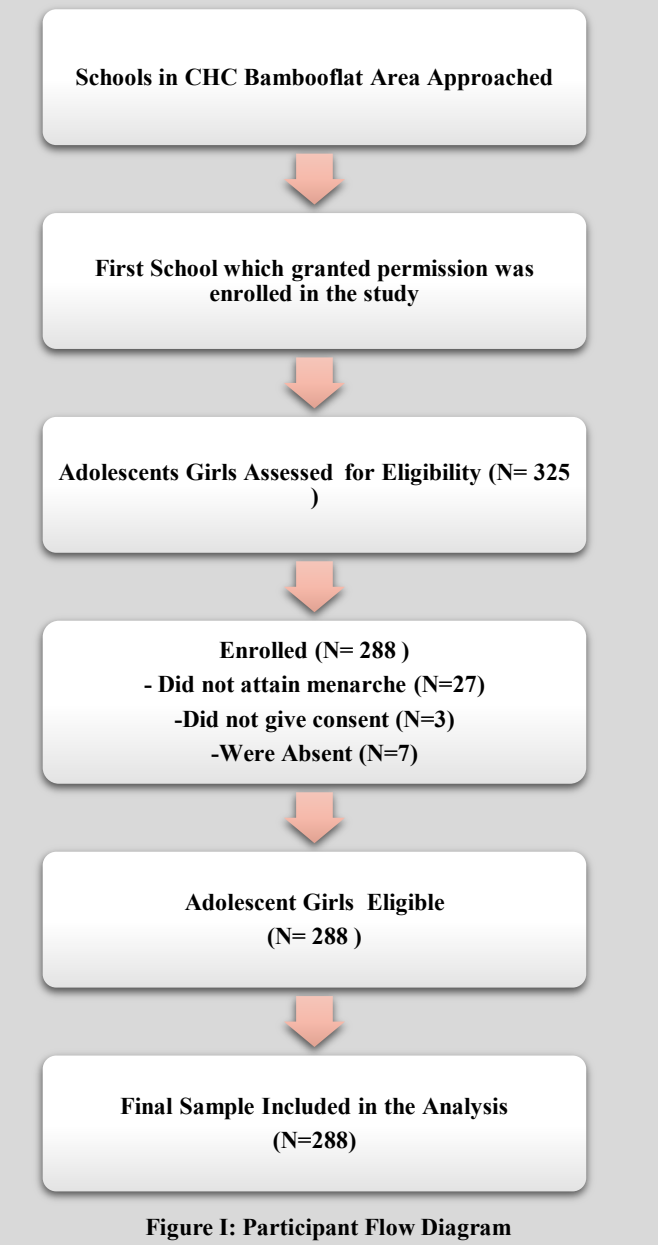

Figure I: Participant Flow Diagram

Data Collection Tools and Procedure

Data were collected using a pre-tested, structured questionnaire developed in English and translated into the local language (Hindi). The tool was adapted from standard MHM and adolescent health survey instruments and covered the following domains:

- *Socio-demographic information:* Age, Grade, Parental education, Socio-economic status.
- *Menstrual history and disorders:* Cycle regularity, Duration, Pain, and Associated symptoms.
- *Knowledge and perceptions:* Awareness prior to menarche, Source of information, Beliefs and restrictions.
- *Hygiene practices:* Type of absorbent used, Frequency of change, Disposal methods, Bathing, and genital hygiene.
- *School-related impact:* Absenteeism during menstruation, Effect on academic performance, participation in activities.
- *School environment:* Availability of toilets, Water, Soap, Disposal bins, Privacy, and Health education sessions.

The questionnaire was self-administered under supervision in classrooms, with privacy maintained. Trained female investigators assisted participants who required clarification.

Ethical approval was obtained from the Institutional Ethics Committee of Andaman and Nicobar Islands Institute of Medical Sciences. Permission was also secured from the competent School authorities. Written informed consent was obtained from parents/guardians through an online Google consent form link, and verbal assent was taken from the adolescent participants. Confidentiality and anonymity were ensured throughout the study.

Completed questionnaires were checked daily for completeness and consistency. Data were entered into Microsoft Excel and analyzed using SPSS (version 27). Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarize participant characteristics, knowledge, and practices. Chi-square tests and logistic regression were applied to examine associations between menstrual disorders, hygiene practices, and school absenteeism. Statistical significance was set at $p < 0.05$.

Results

A total of 288 adolescent schoolgirls participated in this study. The socio-demographic profile (**Table I**) revealed that the cohort was overwhelmingly composed of younger adolescents aged 13-15 years (93.5%), with the majority residing in rural areas (83.6%) and belonging to middle socioeconomic status families (62.5%). Academically, most participants were enrolled in upper primary (54.4%) or secondary (42.8%) school grades.

Assessment of knowledge and awareness prior to menarche (**Table II, Figure II**) indicated that nearly all participants (98.9%) had heard of menstruation before its onset. Mothers were the predominant first informants (69.1%), significantly outweighing other sources such as media (13.9%), friends (7.7%), teachers (6.9%), and sisters (2.4%). However, foundational biological knowledge was deficient, as only 60.1% of girls correctly identified menstruation as a biological process and 59.7% knew of the involvement of the uterus. Prior awareness of menstrual hygiene practices was reported by 69.8% of respondents.

The analysis of menstrual hygiene practices (**Table III**) demonstrated that the use of commercial sanitary pads was the near-universal norm (94.1%). Most participants (71.8%) reported changing their absorbent 3-4 times per day, a frequency associated with better hygiene, while 24.3% changed twice or less. For disposal, the use of a dustbin was the most common method (76.1%), though concerning practices were reported, including disposal in the open ground (5.5%) and burning (2.7%). The vast majority of girls (84.7%) maintained daily bathing during menstruation.

Crucially, several factors demonstrated a strong, statistically significant association with poor menstrual hygiene status (**Table IV**). The choice of absorbent was absolute; all users of cloth (100%) or other materials (100%) had poor hygiene, compared to 54.2% of sanitary pad users ($p<0.001$). The frequency of changing absorbents was a powerful predictor; infrequent changing (≤2 times/day) was universally associated with poor hygiene (100%, $p<0.001$), whereas more frequent changing was linked to better outcomes. Disposal method was also critical, with all girls who used methods other than a dustbin (open ground, burning, or other) exhibiting poor hygiene (100% for each category, $p<0.001$). Hygienic bathing practices were essential, as not bathing daily was completely associated with poor hygiene status (100%, $p<0.001$). Furthermore, even foundational knowledge played a significant role; girls who did not recognize menstruation as a biological process were significantly more likely to have poor hygiene (60.0% vs. 50.3%, $p=0.046$).

Multivariable analysis, presented as a forest plot (**Figure III**), identified three paramount behavioural correlates of good menstrual hygiene. The use of sanitary pads, a higher frequency of absorbent change (3-4 times/day), and disposal in a dustbin were all overwhelmingly associated with improved hygiene practices, as demonstrated by significantly elevated unadjusted odds ratios ($p<0.001$ for all). These key modifiable factors were the strongest independent predictors of optimal menstrual hygiene status among the study participants.

An analysis of socio-demographic correlates (**Figure IV**) revealed notable trends, although no statistical tests were provided for these specific comparisons. The prevalence of good menstrual hygiene was lowest among older adolescents (16-18 years, 28.6%) and those in higher secondary school (XI-XII, 25.0%). A clear socioeconomic gradient was observed, with good hygiene practices reported by 46.7% of girls from middle-class families compared to 38.1% from upper-class and 27.3% from lower-class families. Notably, rural residents reported a slightly higher prevalence of good hygiene practices than their urban counterparts (44.0% vs. 38.3%).

Table I: Socio-demographic Profile of Study Participants

Variable Categories		N	%
Age group (Years)	10-12	12	4.1
	13-15	269	93.5
	16-18	7	2.4
Class	VI-VIII	157	54.4
	IX-X	123	42.8
	XI-XII	8	2.8
Socioeconomic Status	Upper	97	33.7
	Middle	180	62.5
	Lower	11	3.8
Place of Residence	Urban	47	16.4
	Rural	241	83.6

Table II: Knowledge and Awareness Regarding Menstruation Prior to Menarche

Knowledge/Perception		Responses	
		N	%
Heard of Menstruation before menarche	Yes	285	98.9
	No	3	1.1
First informant	Mother	199	69.1
	Sister	7	2.4

	Teacher	20	6.9
	Friend	22	7.7
	Media	40	13.9
Knows that Menstruation is a biological process	Yes	173	60.1
	No	115	39.9
Knows that Uterus is involved	Yes	172	59.7
	No	116	40.3
Awareness of hygiene practices before attaining menarche	Yes	201	69.8
	No	87	30.2

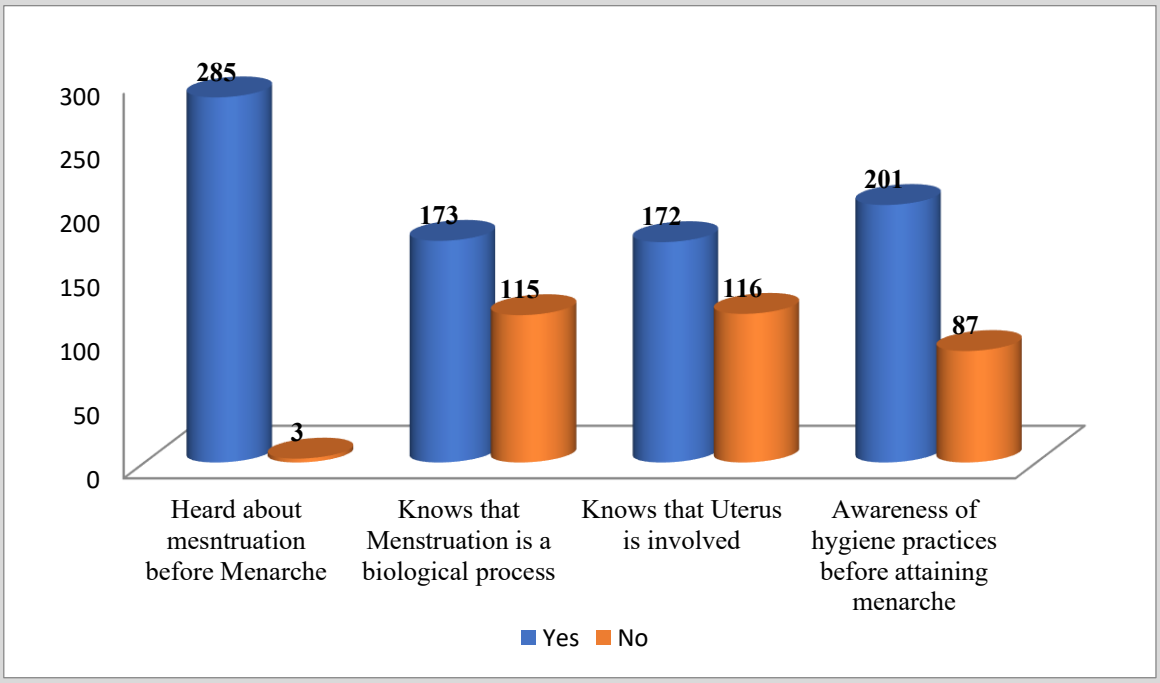

Figure II: Knowledge and Awareness Regarding Menstruation

Table III: Menstrual Hygiene Practices Reported During the Last Menstrual Cycle

Practice Dimensions		**N**	**%**
Absorbent Used	Sanitary Pad	271	94.1
	Cloth	8	2.7
	Others	9	3.2
Frequency of Change/day	≤2	70	24.3
	3-4	207	71.8
	≥5	11	3.9
Disposal Method	Dustbin	219	76.1
	Open Ground	16	5.5
	Burnt	8	2.7
	Other	45	15.7
Washing of cloth (If used)	With soap & sun dried	6	75
	Only washed	2	25
Bathing during menstruation	Daily	244	84.7
	Alternate Day	27	9.3
	Not practiced	17	6.0

Table IV: Association of Key Factors with Menstrual Hygiene Status Among Adolescent Girls

Knows Menstruation is biological (χ^2=3.995, p=0.046)					
Category	Good	Poor	Total	% Good	% Poor
Yes	86	87	173	49.7	50.3
No	46	69	115	40.0	60.0
Absorbent used (χ^2=19.648, p<0.001)					
Category	Good	Poor	Total	% Good	% Poor
Sanitary pad	124	147	271	45.8	54.2
Cloth	0	8	8	0.0	100.0
Others	0	9	9	0.0	100.0

Frequency of pad change (χ^2=85.209, p<0.001)					
Category	Good	Poor	Total	% Good	% Poor
<=2	0	70	70	0.0	100.0
3–4	124	83	207	59.9	40.1
>=5	8	3	11	72.7	27.3
Disposal method (χ^2=68.608, p<0.001)					
Category	Good	Poor	Total	% Good	% Poor
Dustbin	124	95	219	56.6	43.4
Open Ground	0	16	16	0.0	100.0
Burnt	0	8	8	0.0	100.0
Other	0	45	45	0.0	100.0
Bathing during menstruation (χ^2=39.267, p<0.001)					
Category	Good	Poor	Total	% Good	% Poor
Daily	124	120	244	50.8	49.2
Alternate Day	0	27	27	0.0	100.0
Not practiced	0	17	17	0.0	100.0

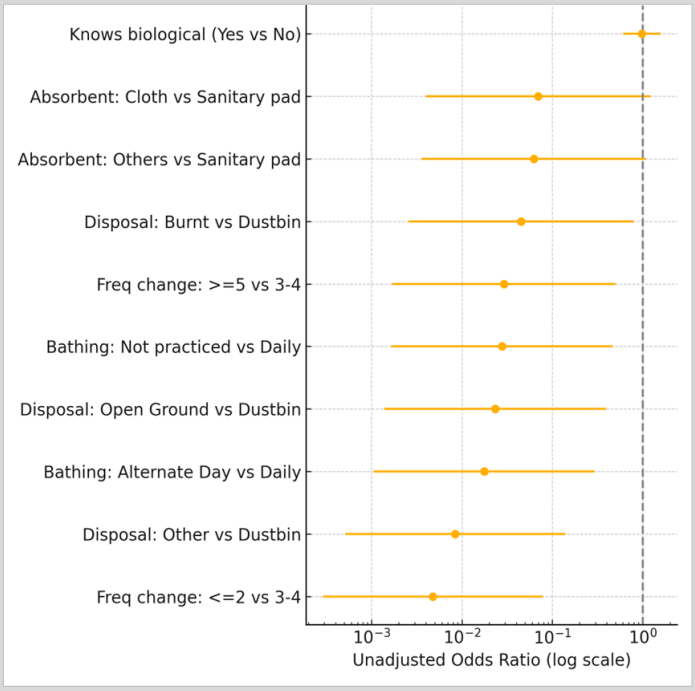

Figure III: Unadjusted Odds Ratios (95% CI) for Key Correlates of Good Menstrual Hygiene Practices Among Adolescent Girls (n=288)

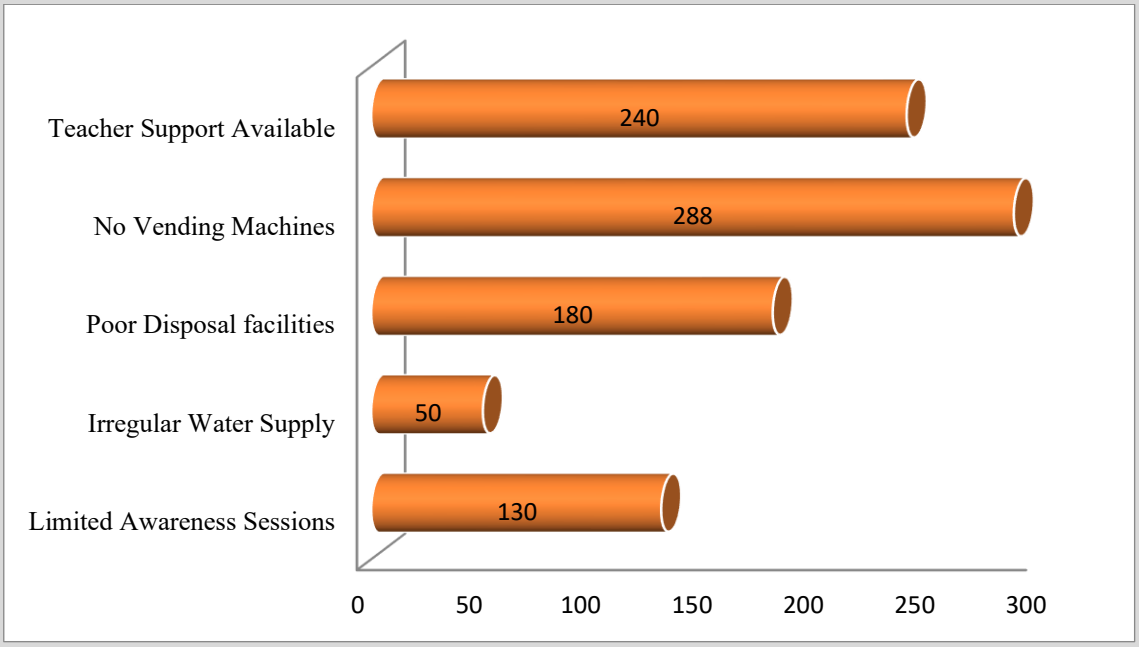

Figure IV: Reported Challenges in School Settings for Menstrual Hygiene Management Among Adolescent Girls (N=288)

Discussion

This study provides a critical analysis of the menstrual hygiene management (MHM) landscape among adolescent girls, revealing a complex interplay between encouraging advancements and persistent, deep-rooted challenges. The high prevalence of sanitary pad use (94.1%) signifies a major shift towards modern hygiene products, a finding that stands in stark contrast to many earlier studies. However, this progress is dramatically undermined by significant deficits in core hygiene practices, a lack of foundational biological knowledge, and the pervasive influence of socio-cultural taboos. This discussion situates these findings within the broader context of existing literature to elucidate the multifaceted nature of MHM and identify critical areas for intervention.

Sanitary Materials Used

The striking finding of this study is the near-universal adoption of commercial sanitary pads (94.1%) by the adolescent girls. This rate is substantially higher than those reported in similar contexts. For instance, studies in urban Indian slums reported usage rates of only 60% [10], while research in Uttarakhand found that just 38.4% of adolescent girls used sanitary napkins (Juyal *et al*., 2012) [11]. Similarly, in Kano, Nigeria, while most schoolgirls used pads, a significant minority relied on cloth due to cost [12]. This high level of use in our study population suggests successful penetration of government schemes, NGO initiatives, or market-based distribution of modern absorbents, representing a significant public health achievement.

However, this success is superficial when examined alongside hygiene practices. The type of absorbent used is a necessary but insufficient indicator of good menstrual hygiene. Our study powerfully demonstrates this: despite the high pad usage, over half (54.2%) of the users were classified as having poor overall menstrual hygiene status. This critical disconnect underscores that ownership of a product does not equate to its correct and healthy application. The absolute association (100%) between the use of cloth or other materials and poor hygiene status ($p<0.001$) reaffirms that sanitary pads are the superior choice, as also concluded by Davis *et al*. (2018) in Indonesia [13]. However, the key determinant of hygiene is not the material itself, but the behavior governing its use.

Hygiene Practices and Disposal

The most significant predictors of poor hygiene in our study were behavioral. The frequency of changing absorbents emerged as a paramount factor. Infrequent changing (≤2 times/day) was universally associated with poor hygiene status (100%, $p<0.001$). This practice, reported by almost a quarter (24.3%) of our respondents, poses serious health risks, including reproductive tract infections (RTIs) and urinary tract infections (UTIs). This finding aligns with the multi-country study by Davis *et al*. (2018), which identified infrequent changing as a primary component of poor MHM. The reasons are often rooted in the school environment: limited access to clean, private, and functional WASH facilities, fear of staining or being discovered by male peers, and a lack of time between classes. These challenges in school settings create a significant barrier to practicing optimal hygiene, forcing girls to extend the use of absorbents beyond safe limits.

Similarly, disposal methods presented a major concern. While disposal in a dustbin was the most common practice (76.1%), a concerning 23.9% of girls resorted to unsafe methods like open disposal (5.5%) or burning (2.7%). Our analysis found that any deviation from dustbin disposal was absolutely associated with poor hygiene (100%, $p<0.001$). This highlights a critical environmental and public health challenge. In school settings, the absence of discreet, hygienic, and accessible disposal mechanisms-such as covered bins in toilet stalls with regular, safe waste collection-compels girls to adopt unsafe practices. Deshpande *et al*. (2018) reported similar issues in an Indian slum, where girls struggled with disposal due to a lack of privacy and facilities [10]. The practice of burning, while potentially seen as a method of cleansing, releases harmful toxins and is not a safe or sustainable solution. The environmental impact of non-biodegradable pad waste, when not disposed of properly, is another looming crisis that requires attention alongside immediate health concerns.

Knowledge, Perceptions, and the Role of Information

A profound gap exists between awareness and accurate knowledge in our study cohort. While an overwhelming majority (98.9%) had heard of menstruation before menarche–a rate higher than the 64.5% reported by Juyal *et al*. (2012) or the 76% who were unaware in the study by Deshpande *et al*. (2018)–the quality of this information was deficient. Only about 60% of girls understood menstruation as a biological process (60.1%) or knew the uterus was the source of bleeding (59.7%) [10,11]. This mirrors the findings of Yasmin *et al*. (2013) in West Bengal, where despite high awareness, knowledge of the biological basis was poor [14].

Mothers were the primary source of information (69.1%), a common finding across studies in India and Egypt [11,15]. However, this reliance on mothers can perpetuate a cycle of misinformation if the mothers themselves lack scientific knowledge, as suggested by the high proportion of girls with incorrect beliefs. The significant association ($p=0.046$) between lacking knowledge of menstruation as a biological process and having poor hygiene status underscores that accurate knowledge is a key determinant of healthy practice. When menstruation is shrouded in mystery and perceived as unclean or shameful, as reported in the Indonesian study, it fosters practices driven by secrecy rather than health, such as infrequent changing or unsafe disposal [13].

Reported and Implied Challenges in School Settings

Although our study did not directly quantify school absenteeism, the practices we identified are precisely those that lead to absenteeism and reduced participation in other studies. The challenges are multifaceted:

1. **Infrastructural Deficits:** The high percentage of rural girls (83.6%) in our study points to potential issues with school WASH facilities, which are often poorer in rural areas [13]. The lack of water, soap, privacy, and safe disposal bins in school toilets makes it impossible for girls to manage their menstruation hygienically and with dignity.
2. **Psychosocial Factors:** The perception of menstruation as shameful, evidenced by the limited biological knowledge, contributes to anxiety and fear of leakage or teasing. This "culture of silence" forces girls to manage their periods secretly, often adopting poor hygiene practices to avoid detection. Davis *et al*. (2018) directly linked the belief that menstruation should be kept secret to higher rates of school absenteeism [13].
3. **Pain and Discomfort:** While not the focus of our study, menstrual pain (dysmenorrhea) is a well-documented cause of school absenteeism globally. The lack of support for pain management in schools further compounds the challenges adolescent girls face.

Conclusion and Recommendations

In conclusion, the high usage of sanitary pads in this study population is a positive indicator of improved access to materials. However, it masks a more troubling reality where access has not been coupled with the necessary education, infrastructure, and societal change to ensure healthy and dignified MHM. The disparities between our findings and those of earlier studies highlight that progress is possible, but it must be holistic.

To address the gaps identified, a multi-pronged approach is essential:

1. **Behavior Change Communication (BCC):** School-based educational programs must move beyond basic awareness to impart robust, age-appropriate knowledge about the biology of menstruation. These programs should specifically target behaviors like the importance of changing absorbents every 4-6 hours and safe disposal methods. Engaging mothers through parent-teacher meetings can help break the cycle of misinformation.
2. **Improvement of School WASH Infrastructure:** Governments and school administrations must prioritize making school toilets girl-friendly. This includes ensuring they are functional, private, lockable, and equipped with water, soap, and dedicated, safe disposal systems for menstrual waste.
3. **Addressing Psychosocial Well-being:** Creating a supportive environment is crucial. This involves sensitizing teachers and male students to reduce stigma, integrating MHM into school health policies, and ensuring girls have a designated person (like a female teacher or counselor) to approach for help or supplies.

This study reinforces that MHM is not merely a sanitation issue but a comprehensive one involving health, education, gender equality, and human rights. Future interventions must be integrated, moving beyond the distribution of pads to create an ecosystem where knowledge, positive social norms, and supportive infrastructure empower every adolescent girl to manage her menstruation safely, hygienically, and with dignity.

Declarations

Acknowledgements

The authors wish to express their profound appreciation to the Principal and faculty of the participating school for granting authorization and enabling the execution of this study. We are also thankful to the student participants for their invaluable contribution. The assistance provided by the then third-year MBBS students of ANIIMS, Sri Vijaya Puram-namely, Lawshila Jose, Ananya, Alviya Abbas, and Vani Sharma—during the data collection phase is gratefully recognized. Finally, we acknowledge the essential support offered by the administrative staff of the Department of Community Medicine, ANIIMS.

Conflict of interest

The authors declare no conflict of interest.

Funding/ financial support

This research received no external funding or financial support.

Ethical Clearance

Ethical clearance for the study was obtained from the Institutional Scientific and Research Committee (ISRC), Andaman and Nicobar Islands Institute of Medical Sciences (ANIIMS) Medical College.

Trial details

NA

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