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The Relationship between Menstrual Health Behaviours and Self-Efficacy among Rural Women in Mangalore, India: A Community-based Cross-sectional Study

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ABSTRACT

Background & aim: Menstruation, a physiological process in women, requires proper hygiene to prevent health risks. Lack of knowledge and cultural taboos can lead to unsafe behaviours, potentially affecting women's well-being. This study aimed to determine the relationship between menstrual health behaviours and self-efficacy among Rural Women in Mangalore.

Methods: A community-based cross-sectional study was undertaken among 275 females aged 15-49 years in the rural area of Mangalore taluk, India from October 2022 to July 2023. Data on menstrual practices and self-efficacy was collected using (MPQ) Menstrual Practice Questionnaire and Self Efficacy in Addressing Menstrual Needs Scale (SAMNS-26) questionnaire. Convenient sampling was used to select the village and systematic sampling was used to select the households. The data was analysed through EpiData Manager V 4.6.0.6 and STATA version 14. Independent t-test, one-way ANOVA, and linear regression analysis were used.

Results: Around 20% of the women relied on cloth for menstrual protection, while 80% used disposable sanitary pads. 44.4% of participants flushed their menstrual materials after using them. Almost 40% of participants expressed privacy concerns about the disposal of menstrual waste. The women's average self-efficacy scores were 58.24 ± 17.03 (min and max). Regression analysis showed significant relationships between self-efficacy and location for drying menstruation fabric as well as occupation ($p<0.05$).

Conclusion: This study highlights a lack of good menstrual hygiene practices among women, alongside persistent practices that adversely affect women's confidence during menstruation. A necessary program to raise awareness about their menstruation practice should be designed.

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Introduction

Menstruation is a normal process for women between menarche and menopause. Menstrual health is important for women's overall well-being, but menstrual hygiene management (MHM) is still a taboo subject in India (1). Nearly 23 million girls drop out of school annually due to subpar MHM facilities, and menstrual hygiene problems account for almost 800,000 fatalities each year (2). The absence of accessible menstrual facilities significantly influences the health and well-being of women. Women in rural areas sometimes use unhygienic menstruation absorbents due to a lack of resources and knowledge. Engaging in certain health behaviours during menstruation, such as using tampons, douches, or practicing vaginal washing, may be associated with an increased risk of developing endometriosis (3).

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Additionally, women who utilized cloth menstrual pads during their menstrual cycles exhibited a risk approximately twice as high as those who did not partake in these practices to sanitary products. A proper MHM education is necessary for empowering women, boosting self-esteem, and boosting academic performance (4).

A study conducted in West Gonga municipality of Ghana reported that participants used sanitary pads and old clothes as menstrual materials (5). In Southern Ethiopia, 48.1% of adolescent girls used absorbent products like sanitary pads, while in Rukungiri district of Uganda, cloth was utilized by 87.1% of the girls (6-7). Among women of reproductive-age in Southwest Delhi, (India) 91.3% were using sanitary napkins, while in the slums of Kolkata, 67.7% used sanitary pads (8-9). In Rajasthan, 84.3% of girls reused cloth after washing, while in Bangalore city, sanitary pad usage during the menstrual cycle was found to be 44% (10-11). Amongst the girls in Mangalore, 49.2% of rural and 65% of urban girls were using sanitary napkins (12).

In a study which examines safe methods for disposing of menstrual waste and the impact of cultural limitations and beliefs on women's lives during menstruation found due to societal norms and beliefs, many women face restrictions on their daily activities, such as cooking, intimacy, showering, and even mobility during their periods (13). Understanding women's lived experiences requires an understanding of their self-efficacy beliefs in managing their monthly needs. Women with lower self-efficacy may find challenges more stressful and avoid difficult situations, such as attending school while menstruating. Addressing these challenges is essential to ensure that women can confidently carry out their regular activities without fear or discomfort (14).

A study in Bangladesh found that using a sanitary napkin was linked to confidence in performing chores while menstruating (15). In contrast, only 16.2% of University students in Australia felt completely confident managing menstruation (16). Menstrual symptoms can influence performance and self-confidence, as seen in a survey of top rugby players (17). Reusable napkins were found to be comfortable and easy to use, with 83.6% of married women surveyed saying they would recommend them to friends. Women in Bangladesh who used sanitary napkins had more self-confidence (13).

The study among rural women in Mangalore documented the association between menstruation practices and self-efficacy (12). The lack of attention to menstrual hygiene management not only deprives women of essential care but also diminishes their self-efficacy, affecting their daily performance (3). By identifying factors that influence self-efficacy and exploring barriers to proper MHM, this study seeks to address the knowledge gap in menstrual practices and hygiene management among rural women and to promote awareness and support initiatives for improved menstrual hygiene and women's well-being in the region. So, this study was conducted to determine the relationship between menstrual health behaviours and self-efficacy among rural women in Mangalore.

Materials and Methods

A community-based cross-sectional study was conducted in Mangalore taluk in Dakshina Kannada, India. The study population consisted of females aged 15-49 years who were willing to participate in the study. The females with primary amenorrhea, those who had attained menopause, undergone hysterectomy, or were pregnant were excluded from the study.

To estimate sample size, National Family Health Survey (NFHS-5) report was used in which 79.8% of women aged 15-24 in rural areas used hygienic methods during menstruation. Assuming this proportion for adequate menstrual hygiene practices with a 5% absolute precision, the calculated sample size was 247. Accounting for a 10% non-response rate, the final estimated sample size for the study was 275. The convenient sampling was used to select the villages and systematic sampling was used to select the households.

From Mangaluru Taluk three villages (Permude, Badagayekkar, and Tenkayekkar) were selected through convenience sampling from the taluk. Permude village has three wards and a population of 2,089, Badagayekkar village has four wards with a population of 4,388, and

Tenkayekkar village has three wards with a population of 3,999. Two wards from each village were selected using the lottery method. In Permude, 31 households were chosen from Ward 1 and 18 households from Ward 3; in Badagayekkar village, 55 and 63 households were selected from Wards 1 and 3, respectively; and in Tenkayekkar village, 75 households were selected from Ward 1 and 33 households from Ward 3, using proportionate sampling. Within each selected household, one eligible female of reproductive age was randomly chosen (using the chit method) to participate in the survey, continuing until the desired sample size of 275 was reached. The sampling technique used in this study is illustrated in Figure 1.

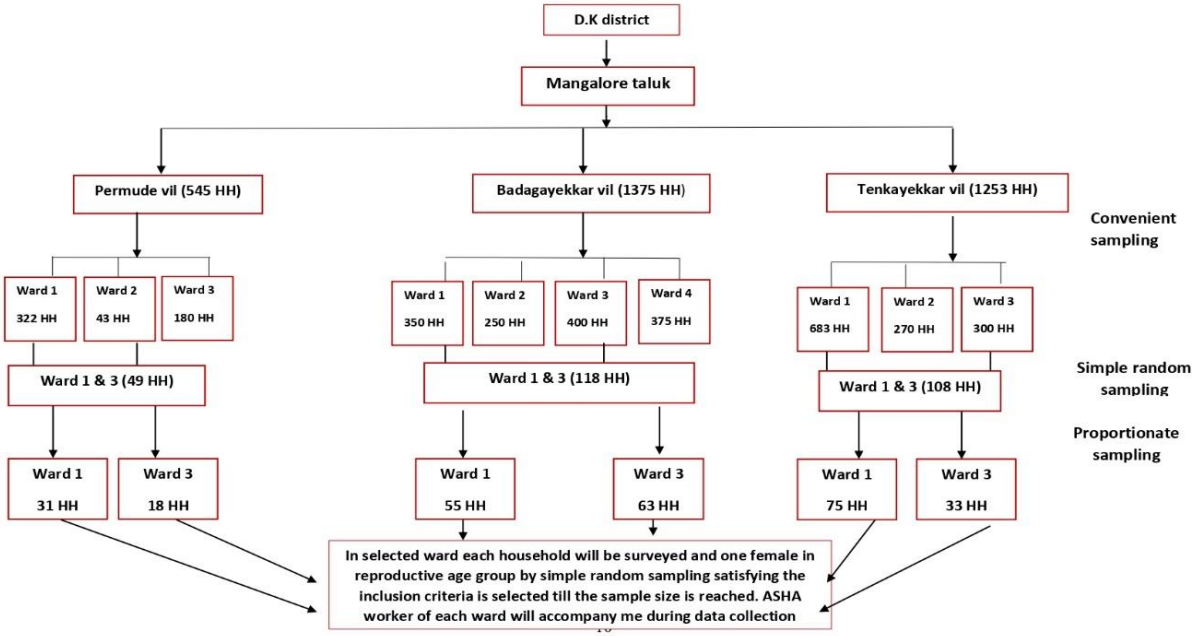

Fig 1: representation of sampling technique

The data was collected in paper-based forms during April to May 2023. A trained field investigator conducted face-to-face interviews using a structured questionnaire to collect data on demographics, menstrual hygiene, and self-efficacy. To ensure consistency and reduce errors, data was gathered in person. In each selected household, one eligible female of reproductive age was randomly chosen using the chit method to participate in the survey.

To determine the menstrual practice, Menstrual Practice Questionnaire (MPQ) questionnaire was used. The MPQ questionnaire has 8 sub-sections which details about menstrual material used, hand washing, genital washing, storage of menstrual materials, washing material (if cloth /reusable sanitary pad used), drying materials (if cloth/ re-usable sanitary pad used), additional sterilization practices and disposal of menstrual materials. To determine self-efficacy, Self-Efficacy in Addressing Menstrual Needs Scale (SAMNS-26) questionnaire was used. SAMNS-26 questionnaire consists of 26 items and the response were marked using a score which ranges from 0-100. Higher the scores, high is the self-efficacy level of women. The questionnaire had a reliability score of $\alpha = 0.84$(18).

For participant were interviewed by trained field investigator, a validated semi-structured questionnaire was administered after obtaining written informed consent from the participants.

Data analysis was carried out using EpiData Manager V 4.6.0.6 and STATA version 14. Categorical variables were summarized as frequencies and percentages, while continuous variables were summarized as mean and standard deviation. The prevalence of menstrual practices was calculated with a 95% confidence interval. The association of socio-demographic, behavioural factors, and menstrual practices with self-efficacy was analysed using Independent-T-test, one-way ANOVA, and linear regression analysis was done to find the independent association of socio-demographic, behavioural factors and menstrual practices with self-efficacy. A p-value less than 0.05 were considered statistically significant.

Results

The study population consisted of reproductive-aged females with a mean age of 31.08 ± 11.34 years, ranging from 15 to 49 years. The majority (27.6%) were aged 15-21 years, while 21.5% were aged 43-49 years. Most (27.2%) had secondary education, while 8.0% did not receive any formal education. The majority (41.8%) were daily wage workers, while 1.4% were unemployed. In terms of marital status, 58.2% were married and 6.2% were widowed. Most (85.5%) stayed in nuclear families and belonged to the upper-class category of socio-economic status (34.1%). The mean age of attaining menarche was 13.94 ± 1.69 years. More than half (60%) did not experience menstrual pain, but 65.4% faced various restrictions at home during menstruation and 54.2% did not receive any family support during menstruation. Table1 depicts the socio-demographic, behavioural, and menstrual practices of the study population.

Table 1. Socio-demographic profile and behavioural profile of study population (n=275)

Variables	N (%)
Age (in years)	
15-32	140 (50.91)
33-49	135 (49.09)
Marital status	
Married	160 (58.2)
Unmarried, Widower	115 (41.8)
Type of family	
Nuclear	235 (85.5)
Joint	40 (14.5)
Education	
No formal education	22 (8.0)
Primary education	55 (20.0)
Secondary education	75 (27.2)
Higher secondary education	49 (17.8)
Undergraduate, Postgraduate	74 (26.9)
Occupation	
Student	72 (26.18)
Monthly salaried	31 (11.27)
Daily wages	53 (19.27)
Homemaker	119 (43.27)
Socio-economic status*	
Upper class	94 (34.1)
Upper middle class	47 (17.3)
Middle class	26 (9.4)
Lower middle class	65 (23.6)
Lower class	43 (15.6)
Menstrual pain	
No	165 (60.0)
Yes	110 (40.0)
Restrictions faced during menstruation	
No	95 (34.6)
Yes	180 (65.4)
Family support	
No	149 (54.2)
Yes	126 (45.8)

*B.G Prasad classification of socio-economic status 2022

Table 2 shows that 78.5% of rural women used disposable sanitary pads at home and 80.4% away from home, while 20.8% used cloth at home and 17.9% outside home. Menstrual cup (1.0%) and tampon usage (0.7%) was low. Around 22.2% of women washed and reused their menstrual material, with 71.95% washing in a basin located inside home and 59.6% dried the fabric inside their home. 59.6% reported not exposing their menstrual material to sunlight, with 84.3% of cloth users using the cloth after it was completely dried. 68.7% did not wash their hands before changing their menstrual material, while 77.4% washed their hands after changing their menstrual material, with half of the females (50.3%) washing their genitals twice per day and 45.4% washing only one time per day, with 51.6% using soap to wash their genitals. Almost half of the females (49.9%) stored their menstrual material in the toilet after their last menstrual period, with 42.9% storing it in cupboard or drawer and 2.9% not storing any menstrual material, with almost half (49.2%) storing it without wrapping it and 32.5% wrapping it up in a plastic bag, while only 1.1% wrapped it in paper. According to disposal

practices, 44.5% of females flushed the menstrual material into the latrine while being home and 61.5% while being away from home, with 21.8% burning the menstrual material while being home and 25% transporting it to home to dispose or reuse it. More than half (61.4%) did not wrap their used menstrual material before disposing it and 28% wrapped it up in a plastic bag or cover of the pad itself, with privacy being the main factor influencing choice of disposal for 39.3% of females.

Table 2. Menstrual hygiene practices in study population (n=275)

Variable	N (%)
Type of absorbent used –at home	
Cloth	57 (20.8)
Disposable sanitary pad	216 (78.5)
Menstrual cups	02 (0.7)
Absorbent used-while away from home	
Cloth	49 (17.9)
Disposable sanitary pad	221 (80.4)
Menstrual cups	03 (1.0)
Tampons	02 (0.7)
Washing hands-before changing menstrual material	
No	189 (68.7)
Yes	86 (31.3)
Washing hands-after changing menstrual material	
No	62 (22.6)
Yes	213 (77.4)
Frequency of washing genitals	
Every 2-3days	12 (4.3)
Once per day	125 (45.4)
Twice per day	138 (50.3)
Usage of soap	
No	133 (48.4)
Yes	142 (51.6)
Place of storing menstrual material	
Cupboard, drawer	118 (42.9)
Under bed	12 (4.3)
In the toilet	137 (49.9)
Not stored	08 (2.9)
Was it wrapped while storing (n=267)	
Wrapped	136 (50.94)
Not wrapped	131 (49.06)
Disposal of menstrual materials –while home	
Flushed in to latrine	122 (44.5)
Burned	60 (21.8)
Household rubbish	36 (13.2)
Buried	06 (2.1)
Thrown in water	01 (0.3)
Not disposed	50 (18.1)
Disposal-while away	
Carried home to dispose	69 (25.0)
Flushed into latrine	169 (61.5)
Bin in latrine	37 (13.5)
Wrapping while disposing	
No	169 (61.4)
Yes	106 (38.5)
Factors influencing choice of disposal	
Hygiene	43 (15.7)
Convenience/ availability of disposal facility	80 (29.0)
Privacy	108 (39.3)
Cultural beliefs	44 (16.0)
Menstrual practices of cloth users (n=57)	
Place of washing	
Basin-inside home	41 (71.9)
Basin-outside home	16 (28.1)
Place of drying the fabric	
Outside (hanging)	08 (14.0)
Outside (hidden)	15 (26.4)
Inside (hanging)	34 (59.6)
Exposure to sunlight	
No	34 (59.6)
Yes	23 (40.4)

Table 3 shows that there is a statistically significant difference between the mean self-efficacy score depending on females' education (p=0.0042), occupation (p=0.0001), and socio-economic status (p=0.0111). Higher education, monthly salary, and middle-class status were associated with higher self-efficacy scores. There was no statistical difference in marital status and type of family females lived in, in comparison to mean self-efficacy score. Women who experienced no menstrual pain and had no restrictions during menstruation had higher self-efficacy scores. Females using disposable sanitary pads both at home and outside the home had higher self-efficacy scores, as did those who washed their menstrual cloth in a basin located outside their home and dried their cloth hanging outside openly. Flushing menstrual material into the latrine was associated with higher self-efficacy while females whose choice of disposal depended on privacy had lower self-efficacy scores.

The summary statistics show that the mean self-efficacy score for reproductive-aged females is 58.24 ± 17.03 and the median self-efficacy

score is 57.69 (46-71). Female self-efficacy increases as the SAMNS mean score rises.

Table 3. Comparison of socio-demographic profile, menstrual hygiene practices with mean self-efficacy score

Variables	Mean ± SD	Test- Value	P- Value
Education			
No formal education	48.90 ± 15.06		
Primary education	59.40 ± 17.19		
Secondary education	57.03 ± 17.24	3.91	**0.0042***
Higher secondary education	55.01 ± 15.90		
Undergraduate/postgraduate	62.40 ± 16.50		
Occupation			
Student	55.30 ± 17.70		
Monthly salaried	71.06 ± 15.63	7.46	**0.0001***
Daily wages	55.06 ± 17.42		
Homemaker	57.80 ± 15.32		
Socio-economic status			
Upper class	60.05 ± 17.01		
Upper middle class	59.80 ± 17.25		
Middle class	64.72 ± 15.80	3.33	**0.0111***
Lower middle class	54.02 ± 14.90		
Lower class	53.71 ± 18.50		
Marital status			
Married	59.09 ± 16.82	0.9725	0.1658
Unmarried, widower	57.07 ± 17.23		
Type of family			
Nuclear	57.09 ± 17.31	-0.6059	0.7275
Joint	59.07 ± 15.31		
Menstrual pain			
No	61.06 ± 16.2	4.1499	**<0.0001***
Yes	53.17 ± 16.9		
Restrictions faced			
No	61.9 ± 15.6	2.6791	**0.0039***
Yes	56.2 ± 17.4		
Family support			
No	55.7 ± 17.3	-2.6788	0.9961
Yes	61.2 ± 16.2		
Menstrual material used-at home			
Cloth and menstrual cup	51.70 ± 16.7	-3.3446	0.9995
Disposable sanitary pad	60.01 ± 16.7		
Menstrual material used- while away			
Cloth, menstrual cup, tampons	53.8 ± 16.42	-2.12	0.982
Disposable sanitary pad	59.3 ± 17.04		
Place of washing menstrual cloth			
Basin inside home	50.4 ± 14.31	-0.2594	0.6018
Basin outside home	51.7 ± 20.61		
Place of drying the fabric			
Outside (hanging)	59.4 ± 09.87		
Outside (hidden)	46.3 ± 20.22	1.76	0.1814
Inside (hanging)	50.7 ± 14.81		
Place of storing menstrual material			
Cupboard, drawer, under bed	60.17 ± 16.81		
In the toilet	56.12 ± 17.01	1.82	0.1641
Not stored	60.50 ± 18.03		
Was it wrapped while storing			
Wrapping	57.62 ± 17.52	-0.5511	0.7090
No wrapping	58.71 ± 16.51		

Variables	Mean ± SD	Test- Value	P- Value
Disposal-when away from home			
Carried home to dispose or reuse it	52.81 ± 17.7	-3.0891	0.9989
Flushed into latrine	60.05 ± 15.7		
Was it wrapped			
No	56.71 ± 17.7	-1.8302	0.9658
Yes, wrapped	60.62 ± 15.7		
Factor influencing your choice of disposal			
Hygiene	62.61 ± 16.5	4.96	**0.0023***
Convenience/ availability of disposal facility	58.42 ± 15.9		
Privacy	54.06 ± 17.7		
Cultural beliefs	63.91 ± 15.2		

Table 4. Factors predicting self-efficacy among reproductive aged female

Variables	Co-efficient	T-Value	95% (C.I)	P-Value
Education				
No formal education	-18.15	-1.30	-46.5- 10.2	0.201
Primary education	-12.62	-0.92	-40.5- 15.1	0.363
Secondary education	-10.02	-0.79	-35.6- 15.6	0.432
Higher secondary education	-29.41	-1.78	-63.0- 4.03	0.081
Undergraduate		Ref*		
Occupation				
Student		Ref*		
Monthly salaried	**58.6**	2.73	15.1-102.1	**0.010**
Daily wages	11.7	0.94	-13.7-37.1	0.356
Homemaker	12.0	1.07	-10.8-34.8	0.292
Marital status				
Married		Ref*		
Unmarried/widower	5.3	1.04	-5.0-15.6	0.304
Socio-economic status				
Upper class		Ref*		
Upper middle class	-4.1	-0.48	-21.8-13.5	0.637
Middle class	1.0	0.09	-21.3-23.4	0.925
Lower middle class	-8.4	-0.99	-25.6-8.8	0.331
Lower class	-6.6	-0.79	-23.8-10.4	0.434
Menstrual pain				
No		Ref*		
yes	-9.6	-1.80	-20.5-1.2	0.081
Restriction faced during restriction				
No		Ref*		
Yes	-8.9	-1.21	-23.8-5.9	0.233
Place of drying menstrual cloth				
Outside (hanging)		Ref*		
Outside (hidden)	**-15.2**	-2.0	-30.1- -0.4	**0.042**
Inside (hanging)	-6.6	-1.0	-20.3-6.9	0.321
Place of storing menstrual material				
Cupboard, drawer, under bed		Ref*		
Not stored	1.03	0.18	-10.6-12.6	0.858
Influencing factor for menstrual material disposal				
Hygiene	13.1	1.30	-7.4-33.6	0.203
Convenience	12.6	1.54	-3.9-29.2	0.132
Privacy		Ref*		
Religion/cultural belief	11.2	1.85	-1.0-23.5	0.073

Ref* denotes the baseline category to which other categories of a categorical variable are compared

A multiple linear regression was performed to determine the factors predicting self-efficacy among reproductive aged females. After adjusting for confounders, monthly salaried women and women who dry their menstrual material openly outside were significantly associated with self-efficacy. Variables that had a p-value <0.2 in bivariate analysis are included in regression analysis and p-value <0.05 was considered significant (Table 4).

Discussion

This study involved 275 women in Mangalore taluk, Karnataka. Findings revealed that 78.5% use disposable sanitary pads at home and 80.4% use them when away. Approximately 20.8% still use cloth for protection. About 69% did not wash their hands before changing, but over 75% washed after. Regarding disposal, 44.5% chose toilet flushing at home, a quarter flushed away from home, and another quarter brought it home. Privacy influenced 39%, while 29% disposed based on convenience or facility availability. The mean self-efficacy score for reproductive-aged females is 58.24 ± 17.03 and the median self-efficacy score is 57.69 (46-71).

In the current study, the mean age of attaining menarche among reproductive-aged females was 13.9 years. This is higher than the mean age of attaining menarche among reproductive-aged females in Tamil Nadu (13.15 years) and among rural (12.86 years) and urban (12.76 years) females in Nagpur (19-20). However, in Southern Ethiopia, over 25% of females' mean age of menarche was less than 12 years (6).

According to a study, 80% of females prefer to use disposable sanitary pads both at home and away from home. This is similar to findings from surveys in Ethiopia and North Karnataka, India (6,21). Only 20% of the women in this study used cloth during menstruation, whereas studies conducted in West Bengal, Tamil Nadu, and among Ghanaian adolescent girls found that most girls preferred to use clothing rather than sanitary napkins, since it is a traditional practice passed down since ages (5,9,19). The standard practice was to wash the cloth after usage with soap and store it in the toilet until the following menstrual cycle. None of the individuals who used cloth during menstruation had specifically purchased a menstrual cloth for that purpose (22).

The survey found that disposal methods of menstrual material vary widely across different regions. In a union territory of India, 64.5% of adolescent girls burned menstrual material, while in rural Odisha, India, 64.6% disposed of it in the bush or field, and 25% in a waste bin, this is possibly explained by the fact that girls are more attributed by supernatural and cultural perceptions (23-24). In Southern Ethiopia, 44.7% of women disposed of it in the dustbin, while in rural Uganda, 86% of girls brought their menstrual material home to dispose of it as there would be no dustbin to dispose it (5, 25). However, according to our survey half of the women (45%) flushed the menstrual material down the toilet, around 22% burned it, and almost 25% transported it from their place of employment or school to their house to dispose it.

In our survey, 77.4% of women cleansed their hands after changing menstruation materials, and almost 50% washed their genitals twice a day with soap. In the Hoogly district of West Bengal, 80% of adolescent schoolgirls regularly washed their hands and 53% regularly washed their genitalia with water and soap (9). In Southern Ethiopia, about 69.5% of schoolgirls cleaned their external genitalia with water and soap (6). However, a qualitative study in Odisha found that some women do not have access to water or soap during menstruation. Many women dry their menstrual cloths indoors, away from direct sunlight (25). In Puducherry, 34% of cloth users dried their menstrual cloths inside their houses, while in Uttar Pradesh, 58.3% of females who received interpersonal practical guidance and mediated communication used proper drying techniques (24,26).

A survey among school-aged adolescent girls in Nagpur discovered that 35% of females store their monthly absorbent material in the bathroom, whereas in a hospital-based study in Odisha, women who kept their menstruation cloth stored in the toilet compartment reported having Candida infections (20,24). While our study found that 50% of females stored their menstrual absorbent material in the toilet.

The study found that self-efficacy in addressing menstrual needs varies among women. Higher self-efficacy was seen in women with undergraduate and postgraduate degrees, and

from middle-class homes. Women who experienced menstrual cramps and restrictions at home had lower self-efficacy scores which was similar to the studies in Australia and rural India (27-28). The self-efficacy score was lower among cloth users who cleaned their menstrual cloth in a basin within the home (28). Women who stored their menstrual materials in cupboards or drawers had higher self-efficacy. Women concerned about privacy when disposing of menstrual material showed poorer self-efficacy.

Limitations include the possibility of socially desirable responses, inability to assure causality, and stigma related to menstruation. Results can only be extrapolated to similar populations. Further research is needed to compare self-efficacy between urban and rural populations. Conducting in-depth qualitative studies can provide insights into the factors and barriers related to menstrual practices and self-efficacy among reproductive-aged females.

Conclusion

This study focused on the self-efficacy of women in addressing their menstrual needs in Mangalore taluk. The mean self-efficacy score was 58.24, associated with monthly income and drying menstrual clothes outside. Lower scores were found for women with restrictions at home and privacy concerns. The majority used disposable sanitary napkins and flushed them in the toilet. Cloth users maintained privacy when washing and drying, influencing their self-efficacy. Necessary measures should be taken to raise awareness about safer menstruation protection options and eradicate stigma and taboos.

Declarations

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Conflicts of interest

The authors declared no conflicts of interest.

Ethical Considerations

The following ethical considerations were upheld during data collection: informing participants about the research objectives, ensuring voluntary participation, and maintaining confidentiality of the collected data.

This study received approval from the Institutional Ethics Committee (IEC) of K. S. Hegde Medical Academy, Nitte (Deemed to be University), Mangaluru, India, under reference number INST.EC/EC/235/2022, dated 24th November 2022.

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Authors' contribution

Conceptualization was led by Shahal Mansoor; Methodology was developed by Shahal Mansoor and Mackwin Kenwood Dmello; Formal analysis was conducted by Shahal Mansoor; Data Collection was managed by Shahal Mansoor; Data Curation by Mackwin Kenwood Dmello; Writing - Original Draft by Shahal Mansoor; and Writing - Review & Editing by Mackwin Kenwood Dmello. All authors have read and approved the final manuscript and commit to accountability for all aspects of the work, including addressing any issues related to accuracy or integrity.

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