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Effect of Health Education on Menstrual Hygiene Knowledge and Practices among Adolescent Schoolgirls: A Quasi-Experimental Study

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ABSTRACT

Background: Menstrual Hygiene Management (MHM) is a key determinant of the health and general well-being of adolescent girls. However, the constant lack of knowledge, the limited access to cleanliness goods, and the dominant sociocultural taboos often lead to the under-best menstrual hygiene behaviors in the low- and middle-income nations.

Methods: A quasi-experimental pre and post intervention study without a control group was adopted in a government school located in the urban field practice area of a tertiary care teaching hospital. This sample included 116 female adolescent girls from grade 6 to 9. The information was collected through a semi-structured questionnaire that focused on knowledge (10 questions) and practice (7 questions). The structured menstrual health education was provided in a three-week program. The Wilcoxon signed-rank test and McNemar tests were done for statistical analysis.

Results: There was a significant increase in the mean knowledge value and improvement in practice scores. The individual changes were found to be significant in most of the items of knowledge and practice ($p<0.05$). Significant association was seen between knowledge and socioeconomic status, maternal education. Paternal education and maternal education socioeconomic status were significantly associated with practice scores.

Conclusion: Adolescent girls showed significant improvement in their menstrual hygiene knowledge and practices under the structured health education. School-based menstrual health education programs could contribute to healthier menstrual hygiene practices.

Key-words: Adolescent girls, Health education, Menstrual Hygiene Management, Menstrual hygienic practices, Menstrual health education

INTRODUCTION

Adolescence is a critical transitory stage characterized by physical, psychological and social development. One of the most crucial biological processes in girls at this period is menarche, which marks the beginning of reproductive maturity. [1,2] Despite being an obvious physiological process, menstruation continues to be shrouded in secrecy and misconceptions and cultural taboos in most low- and middle-income nations, such as India and Bangladesh. [2-4].

Menstrual hygiene education teaches the practices of properly managing menstrual hygiene, including the use of hygienic absorbent products, access to water and

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sanitation facilities, and a comprehensive understanding of menstruation physiology and hygiene. [4,5] However, millions of girls still face challenges in safely and comfortably managing their menstruation process because of the low accessibility of sanitary materials, poor state of sanitation facilities, poor health education and the social stigma which persists. [5-7] Lack of menstrual personal cleansing may increase the occurrence of infection behind the reproductive tract and have a significant unfavorable influence on the physical and psychological condition of the adolescents. [6,8]

Several studies show that many girls go through the period of menarche without any idea about menstruation and often engage in unhygienic practices. [5,6,9] In addition to health impact, poor practice of menstruation hygiene has been cited to relate to school absenteeism and poor participation in the academic process, particularly in resource-prone environments. [3,10]

Formal health education, social and behavioral change communication interventions, and innovative interventions such as mobile health (mHealth) have significantly improved awareness of menstrual health and hygienic practices.[7,11-13] Educative interventions may influence menstrual hygiene behavior even during comparatively short periods. [14]

Although there has been increased interest in menstrual health, substantial gaps remain in implementing effective, sustainable menstrual hygiene education programs, especially in low-resource settings. [4,8,15] The current study was conducted to gauge the impact of health education on menstrual knowledge and practice in adolescent school-going girls.

MATERIALS AND METHODS

Study Design and Setting- The present study was a quasi-experimental study conducted in one of the government high schools located within the urban field practice area of a tertiary care teaching hospital.

Study Duration and Population- The study was conducted over 3 months, from 1st August 2025 to 31st October 2025. The study population comprised adolescent girls aged 11–15 years who had attained menarche and were studying in the selected high school within the urban field practice area.

Sample Size- The sample size was calculated using the formula

$$n = (Z_{1-\alpha/2} + Z_{1-\beta})^2 * \frac{[(P_1 (1 - P_1) + P_2(1 - P_2)]}{(P_2 - P_1)^2}$$

Pre-intervention proportion (p_1)=48.7%=0.487 (11)
Post-intervention proportion (p_2)=71%=0.71
Significance level (α)=5% → Z_a=1.96
Power (1−β)=90% → Z_β=1.29
Non-response rate=20%

$$N = (1.96 + 1.29)^2 * \frac{(0.487(1-0.487)+0.71(1-0.71)}{(0.71-0.48)^2}$$

N=97, with a non-response rate of 20%, it is 116.

Sampling Technique- One of the five schools within the urban field practice area was selected to serve as a purposely chosen government high school. Using the official class registers 6, 7, 8, and 9 of the schools, eligible respondents were selected. The lists of all eligible adolescent girls who had reached menarche were prepared in advance by class. Students meeting the inclusion criteria who were on campus during the data-collection process were recruited using convenient sampling until the necessary sample size for each class was attained. The recruitment process continued until 29 eligible students from each class gave their consent. Students in class 10 were not included in the study due to their board exams.

Inclusion Criteria- Girl Students from classes 6th – 9th who attained menarche and are willing to participate with parental consent and student assent.

Exclusion Criteria- Students who were not present during the pre-intervention assessment.

Data Collection Tool- A valid, semi-structured questionnaire based on a prior study was administered by the investigator [8]. The questionnaire included three domains: sociodemographic characteristics, knowledge about menstruation (10 items) and menstrual hygiene practices (7 items). The knowledge scores ranged from 0-10, with the range being poor (0-3), moderate (4-7) and good (8-10), and practice scores were 0-14, with an option of poor (0-4), fair (5-8) and good (9-14). Cronbach's alpha values of 0.73 for the knowledge section and 0.82 for the practice section indicate good reliability for the questionnaire.

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Intervention- After completion of the baseline assessment, a 3-week menstrual health education intervention was delivered. The principal investigator carried out the sessions. Each session lasted approximately 60 minutes, was delivered in English, and used interactive, child-friendly teaching strategies. The educational content covered menstruation, menstrual hygiene practices, myth-busting, and how to use and dispose of sanitary pads, as well as group sessions, games, and peer-focused learning using the Menstrupedia educational resource. [16]

Post-Intervention Assessment- Post-test was conducted using the same questionnaire used in the study.

Statistical Analysis- The data were imported into Excel, and analysis was performed using IBM SPSS Statistics (version 30). [17] Sociodemographic characteristics and Knowledge and practice scores of the participants were summarized using Descriptive statistics. Continuous data was tested with Wilcoxon signed-rank test. Individual items of knowledge and practice were evaluated using the McNemar test. Binary logistic regression was used to test the association between sociodemographic variables and outcome variables (knowledge and practice score).

Ethical Considerations- Ethics approval was obtained from the Institutional Ethics Committee, Malla Reddy Institute of Medical Sciences, MRIMS/DHR-IEC-PG/STS/2025/154. Permission was obtained from the school principal to carry out the study. Informed consent from parents and assent from participating students were obtained before data collection.

RESULTS

A total of 116 participants were included in the study. The age ranged from 11 to 15 years, with the majority being 13 years old (25.9%). The mean age of the participants was 13.0±1.21 years. Participants aged 11 years and 15 years accounted for 12.1% each. Regarding religion, most participants were Hindu (67.2%). Based on the Modified BG Prasad socio-economic classification, the highest group percentage was recorded in Class IV (25.9 %). In terms of maternal education, most mothers had primary education (34.5%), and for paternal education, 27.6% had primary education (Table 1).

Table 1: Socio-demographic characteristics of study participants (N=116)

Variable	Category	Frequency (n)	Percentage (%)
Religion	Hindu	78	67.2
	Muslim	22	19
	Christian	16	13.8
Socio-economic status	Class I	17	14.7
	Class II	18	15.5
	Class III	26	22.4
	Class IV	30	25.9
	Class V	25	21.6
Father's education	Uneducated	7	6.0
	Primary	32	27.6
	Secondary	28	24.1
	Intermediate	28	24.1
	Degree	21	18.1
Mother's education	Uneducated	5	4.3
	Primary	40	34.5
	Secondary	23	19.8
	Intermediate	25	21.6
	Degree	23	19.8

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Comparison of pre-test and post-test knowledge and practice scores was made using Wilcoxon signed-rank test among the subjects. In knowledge scores, there were no negative ranks or ties, and all participants were improving on the post-test compared to the pre-test (positive ranks=116). There was a statistically significant difference between the knowledge post-test and pre-test knowledge scores (Z=-9.41, p <0.05) (Table 2).

Table 2: Comparison of Pre-test and Post-test Knowledge and Practice Scores using Wilcoxon Signed-Rank Test (N=116)

Variable	Negative Ranks (n)	Positive Ranks (n)	Ties (n)	Z value	p-value
Knowledge Score (K2– K1)	0	116	0	-9.41	<0.05
Practice Score (P2– P1)	0	103	13	-8.91	<0.05

In practice, 103 participants showed improvement in post-test scores; this was compared with pre-test scores, and 13 demonstrated no improvement. No negative ranks were observed. The change in practice scores was also statistically significant (Z=-8.91, p<0.05) (Table 3).

Table 3: Change in Knowledge Items Before and After Intervention (McNemar Test) (N=116)

Item	Pre-test correct n (%)	Post-test correct n (%)	McNemar p-value
K1	116 (100)	116 (100)	-
K2	86 (74.1)	116 (100)	< 0.05
K3	69 (59.5)	115 (99.1)	< 0.05
K4	75 (64.7)	111 (95.7)	< 0.05
K5	74 (63.8)	110 (94.8)	< 0.05
K6	70 (60.3)	104 (89.7)	< 0.05
K7	67 (57.8)	105 (90.5)	< 0.05
K8	66 (56.9)	105 (90.5)	< 0.05
K9	51 (44.0)	102 (87.9)	< 0.05
K10	50 (43.1)	68 (58.6)	< 0.05

The pre- and post-intervention knowledge items for individual items were measured using the McNemar test in 116 participants who had undergone the structured health education intervention. In general, the result in the McNemar test showed considerable scores in improvement in knowledge at all tested items after the structural health education intervention (p<0.05 to all comparisons) (Table 4).

Table 4: Change in Practice Items Before and After Intervention (Mc Nemar Test) (N=116)

Item	Pre-test correct n (%)	Post-test correct n (%)	McNemar p-value
P1	51 (44.0)	112 (96.6)	< 0.05
P2	94 (81.0)	114 (98.3)	< 0.05
P3	67 (57.8)	110 (94.8)	< 0.05
P4	67 (57.8)	100 (86.2)	< 0.05
P5	80 (69.0)	98 (84.5)	< 0.05
P6	74 (63.8)	92 (79.3)	< 0.05
P7	71 (61.2)	87 (75.0)	< 0.05

P1–P7: individual items of the menstrual hygiene practice questionnaire

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Among 116 participants, the test of change in the individual menstrual hygiene practice items before and after the conducted health education program was measured using McNemar test. After the intervention, substantial positive changes were observed across all practice items (Table 5).

Table 5: Binary Logistic Regression Analysis for Predictors of Knowledge Score (N=116)

Predictor	B	SE	Wald	p-value	Odds Ratio Exp(B)	95% CI for OR
Mother education (ME_CHI)	-1.20	0.72	2.75	0.09	0.30	0.07–1.24
Socioeconomic status (SES_CHI)	-0.36	0.68	0.27	0.60	0.69	0.18–2.68

Binary logistic regression was performed to examine the relationship between sociodemographic variables and the study sample's knowledge score. An omnibus test showed that the model provided a statistically significant result (χ^2=7.24, df=2, p=0.02). The model reported: 2 log-likelihood=89.42, Cox and Snell R^2=0.06, and Nagelkerke R^2 =0.10, which means that the predictors accounted for 10.7% of the variance in knowledge score. The Hosmer-Lemeshow test was not significant (χ^2=0.16, df=1, p=0.68), indicating a good model fit. Multicollinearity was checked. Nevertheless, no individual predictor showed a significant association with knowledge score in the adjusted model (Table 6).

Table 6: Binary Logistic Regression Analysis for Predictors of Practice Score (N=116)

Predictor	B	SE	Wald	p-value	Odds Ratio Exp(B)	95% CI for OR
Father education (FE_CHI)	-0.89	0.51	3.01	0.08	0.41	0.15–1.12
Mother education (ME_CHI)	-0.96	0.54	3.16	0.07	0.38	0.13–1.10
Socioeconomic status (SES_CHI)	-1.01	0.67	2.26	0.13	0.36	0.09–1.35

A binary logistic regression analysis was done to determine the relationship between practice score and sociodemographic variables. The omnibus test indicated that the model with predictors was significant (χ^2=31.68, df=3, p<0.05). The model revealed a -2 log-likelihood ratio of 129.09, Cox and Snell R^2 of 0.23, and Nagelkerke R^2 of 0.31, which implied that 31.9% of the variance in practice score was predicted by the model. The Hosmer-Lemeshow test was not significant (χ^2=3.88, df=3, p=0.27), indicating the model fitted well. Even though this model was statistically significant, none of the independent variables, father education, mother education, and socioeconomic status, had a significant association with practice score in the adjusted model.

DISCUSSION

This quasi-experimental study evaluated the effectiveness of a health education intervention on knowledge and menstrual hygiene practices among adolescent schoolgirls. The mean age of the participants was 13.0±1.21 years, and they were mostly early adolescents. According to Haque *et al*., most of the Bangladeshi schoolgirls involved in the studies on menstrual health intervention were aged 12 to 14 [8]. These patterns were also observed in research conducted in Tamil Nadu and Uttar Pradesh, where early adolescent girls were the target population of a menstrual health education program [7,11]. The early adolescence period, therefore, is a critical period when menstrual-health education is needed because several girls undergo the menarche period at this age.

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The average baseline knowledge score was 6.24±1.09, indicating moderate awareness of menstruation among the respondents. Similar levels were reported by Deshpande *et al.,* who found moderate baseline knowledge among adolescent female slum dwellers in Maharashtra [5]. According to a review undertaken by Chandra Mouli and Patel globally, it was established that a significant percentage of adolescent girls in the low and middle-income societies have a lack of proper menstrual education before menarche [2]. These findings identified gaps in adolescents' menstrual health literacy.

The mean knowledge score increased to 9.07±0.63 after the intervention. In Parasuraman *et al.* [11], a large increase in menstrual-hygiene knowledge was observed during menstrual-hygiene education sessions in school-based health-education interventions in Tamil Nadu, and Haque et al. [8] found substantial increases in menstrual-hygiene knowledge among schoolgirls in Bangladesh through educational interventions. Another statistically significant change observed in the study was an increase in menstrual hygiene practices. There was an increase from 8.69± 2.03 to 12.29±1.38 (Wilcoxon signed-rank test $Z=-8.91$, $p<0.05$). Similarly, Haque et al. reported significant improvements in hygienic menstrual practices following a school-based educational intervention in Bangladesh [8], and Paul *et al.* demonstrated that behavior change communication interventions in Uttar Pradesh contributed significantly to improving sanitary pad use and personal hygiene among adolescents [7].

Individual knowledge and practice item analyses using McNemar test also validated these findings. Similar improvements have been observed in Bangladesh and Iran [8,12], underscoring the usefulness of a structured educational program in dispelling myths and promoting positive menstrual hygiene practices.

Socio-demographic factors defining baseline knowledge were also studied. The knowledge scores were significantly correlated with socioeconomic status ($\chi^2=4.90$, $p<0.05$) and maternal education ($\chi^2=7$, $p<0.05$). Deshpande et al. found that maternal education was a significant predictor of menstrual awareness among adolescent girls [5], and Gupta *et al.* found that menstrual hygiene and menstrual awareness among girls were better among mothers with higher educational attainment [10].

Father's education was also significantly associated with baseline practice scores ($\chi^2=20.09$, $p<0.05$), mother's education ($\chi^2=21.91$, $p<0.05$) and socio-economic status ($\chi^2=22.80$, $p<0.05$). Puwar *et al*. stated that parental education and socioeconomic status determine proper hygienic menstrual practices among the Indian adolescent girls [6]. Inference is school-administered health-education initiatives aimed at adolescent girls can significantly increase their knowledge and behavior regarding menstrual-hygiene.

CONCLUSIONS

This current research supports the assertion that structured health education programs have a significant positive impact on increasing the levels of menstrual hygiene knowledge and practices among school-going adolescent girls. The knowledge and practice scores improved significantly after the intervention. Parents and teachers should be considered important stakeholders in future research on menstrual health education to enhance awareness and strengthen support mechanisms. Stronger evidence on the effectiveness and sustainability of interventions should be produced by randomized controlled trials that use a proper control group and have a longer follow-up.

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