

Changes in knowledge and attitudes following menstrual hygiene education among adolescent girls in an Islamic boarding school: a one-group pretest–posttest study

Syafik Arisandi ^{a*}, Lusi Anggraini ^a, Dina Dwi Nuryani ^a, Dhiny Easter Yanti ^a

^a Department of Public Health, Faculty of Health Sciences, Universitas Malahayati, Bandar Lampung, Indonesia

* Corresponding author: syafika@malahayati.ac.id

ARTICLE INFO

Article history

Received : June 15, 2026

Revised : August 25, 2026

Accepted : August 26, 2026

Keywords:

Adolescent girls;

Attitude;

Health education;

Knowledge;

Menstrual personal hygiene.

ABSTRACT

Menstrual health education is important for adolescent well-being, yet evidence from Islamic boarding schools remains limited. This study assessed changes in knowledge and attitudes immediately following menstrual hygiene education among female students at MTS Darul Huffaz, Lampung. A pre-experimental one-group pretest–posttest design included all 86 eligible students who had experienced menarche. Participants completed a structured knowledge and attitude questionnaire before and immediately after a 15-minute, context-sensitive educational session. Paired-samples t-tests showed significant differences between pretest and post-test knowledge scores ($t = 4.988$, $p < 0.001$) and attitude scores ($t = 4.297$, $p < 0.001$). The proportion classified as having positive attitudes increased, although negative attitudes remained the most common post-test category. The session was followed by immediate improvements in knowledge and attitudes, but the absence of a comparison group and longer follow-up limits causal interpretation and assessment of sustained change. Islamic boarding schools should provide recurring menstrual health education supported by private sanitation, appropriate disposal facilities, and trained staff.

This is an open-access article under the [CC-BY-SA](#) license.



1. Introduction

Menstrual health encompasses physical, emotional, and social well-being and requires accurate knowledge of the menstrual cycle, appropriate hygiene and self-care, access to suitable menstrual products, clean water and sanitation, timely healthcare, and an environment free from stigma [1]. Menstruation is a normal physiological process, but inadequate hygiene may contribute to discomfort and reproductive tract problems [2].

Menstrual health and hygiene are, therefore, a multidimensional public health concern with implications for health, school participation, confidence, and gender equity [3,4]. There were approximately 45% of women experience menstrual cycle disorders, while 1.7 billion people still lack basic hygiene facilities in 2025, despite improved global hygiene coverage [5,6]. Globally, approximately 500 million women and girls lack adequate access to menstrual products or suitable menstrual hygiene management facilities [7]. In low- and middle-income countries, limited knowledge, sociocultural restrictions, and inadequate sanitation remain important barriers; a systematic review in sub-Saharan Africa similarly identified insufficient knowledge and limited menstrual education as determinants of poor hygiene practices [8].

In Indonesia, gaps in menstrual health knowledge and practice remain evident. A study in Bandar Lampung found that many participating adolescents reported vaginal itching or leucorrhea, changed sanitary pads only when they were full, and had never attended menstrual hygiene education [9]. These findings highlight the need for accessible, context-sensitive health education for adolescent girls.

Knowledge [10] and attitudes [11] are important determinants of menstrual hygiene behavior. Adolescents with adequate knowledge tend to report more positive attitudes and healthier practices, while peer norms, sociocultural influences, and exposure to education also shape menstrual health behavior [12,13]. Structured educational interventions can improve menstrual knowledge and hygiene practices and may help challenge taboos surrounding menstruation [14].

Evidence is more limited for adolescents living in Islamic boarding schools (*pesantren*), where communal living, shared sanitation facilities, institutional routines, and sociocultural or religious norms may shape menstrual experiences differently from those in conventional schools. Contextualized education may therefore be needed to ensure that practical guidance is relevant and acceptable to female boarding students (*santriwati*).

A preliminary assessment at MTS Darul Huffaz found that menstrual health education had not previously been provided by the local public health center. Interviews with eight students also indicated a limited understanding of menstrual personal hygiene. The intervention was therefore adapted to the *pesantren* context by linking practical guidance on menstrual hygiene with Islamic principles of cleanliness and purification. This study aimed to assess changes in students' knowledge and attitudes immediately following the educational intervention.

2. Method

2.1. Study Design

This quantitative study used a pre-experimental, one-group pretest–posttest design. A comparison group was not included because the boarding school required all eligible students to receive the same health education. The design assessed within-participant changes immediately after the intervention but could not establish that the intervention alone caused those changes.

2.2. Population and Sample

The study population comprised all 86 female students enrolled at MTS Darul Huffaz, Lampung. Total sampling was used. Eligibility criteria were having experienced menarche, being in good physical health, providing assent, and obtaining consent from a parent or guardian. All 86 eligible students, aged 12–15 years, completed both the pretest and post-test. Data collection took place in the school's main hall.

2.3. Study Variables

Knowledge and attitudes were measured using the Menstrual Hygiene Knowledge and Attitude Questionnaire (MHKAQ). The knowledge scale comprised 10 multiple-choice items scored 1 for a correct answer and 0 for an incorrect answer. The attitude scale comprised 10 statements rated on a four-point Likert scale from strongly disagree to strongly agree; negatively worded items were reverse-scored. Prior testing produced Cronbach's alpha coefficients of 0.75 for knowledge and 0.64 for attitude. The lower coefficient for the attitude scale should be considered when interpreting the findings.

2.4. Educational Procedure

Data collection was conducted on 17 April 2026 in three stages. First, the research team piloted the instruments and standardised delivery of the educational material. Second, participants completed

a five-minute pretest, followed by a 15-minute PowerPoint-assisted session covering menstruation, recommended hygiene practices, sanitary pad use and disposal, and Islamic principles of cleanliness and purification (thaharah). Third, participants completed a five-minute post-test immediately after the session.

2.5. Data Collection

The sampling technique employed was total sampling, meaning that all members of the population who met the inclusion criteria were included in the study sample. Data collection for this study was conducted using a structured questionnaire [15].

2.6. Data analysis

Data analysis was performed using computer software applications through two stages: 1) Univariate Analysis: Used to obtain the frequency and percentage distribution of respondents' demographic characteristics and to describe the categories of pre-test and post-test scores; 2) Bivariate Analysis: Employed the Paired Samples T-Test. The objective was to determine significant differences in knowledge and attitude scores before and after receiving menstrual personal hygiene education.

3. Results and Discussion

3.1. Results

Table 1 presents the characteristics of the 86 participants.

Table 1. Characteristics of Respondents

Characteristics		Frequency	Percentage (%)
Age	≤14 Years Old	62	72.1
	>14 Years Old	24	27.9
Grade	Grade 7	29	33.7
	Grade 8	31	36
	Grade 9	26	30.2
Age of Menarche	9-11 Years Old	39	45.3
	12-14 Years Old	47	54.7

Most participants were aged 14 years or younger (72.1%). Grade 8 students formed the largest group (36.0%), and slightly more than half of the participants reported menarche at 12–14 years of age (54.7%).

Table 2. Frequency Distribution of Pre-Test and Post-Test Scores

Variable	Category	Pre-Test		Post-Test	
		<i>n</i>	%	<i>n</i>	%
Knowledge	Poor	46	53.5	41	47.7
	Good	40	46.5	45	52.3
Attitude	Negative	54	62.8	45	52.3
	Positive	32	37.2	41	47.7

Before the intervention, 53.5% of participants were classified as having poor knowledge and 62.8% as having negative attitudes. After the intervention, 52.3% were classified as having good knowledge (Table 2). Although the proportion with positive attitudes increased from 37.2% to 47.7%, negative attitudes remained the most common post-test category (52.3%).

Table 3. Dependent T-Test Results for Knowledge and Attitude

Variable	N	Mean Difference	r	t-value	Sig (2-tailed)
Knowledge	86	-3.151	0.266	4.988	<0.001
Attitude	86	-1.558	-0.008	4.297	<0.001

Knowledge scores differed significantly between the pretest and post-test ($t = 4.988$, $p < 0.001$), indicating higher knowledge immediately after the educational session (Table 3). Attitude scores also differed significantly between the pretest and post-test ($t = 4.297$, $p < 0.001$), indicating more favourable attitudes immediately after the session (Table 3).

3.2. Discussion

Changes in knowledge following the intervention

Knowledge scores improved immediately after the educational session, and the proportion of students classified as having good knowledge increased. This finding is consistent with evidence that structured education on puberty and menstruation can improve menstrual knowledge, communication comfort, and confidence among adolescent girls [16]. Studies using audiovisual, booklet, leaflet, and digital formats have likewise reported improvements in knowledge of menstrual hygiene [17–21]. Together, this evidence suggests that concise, structured information can address immediate gaps in understanding, although the present design cannot separate the intervention effect from testing or other time-related influences.

The improvement is relevant in a *pesantren* setting, where students live communally and may rely on peers or informal sources for menstrual information. Contextualizing practical guidance—such as pad changing and disposal, genital hygiene, and underwear care—within familiar values of cleanliness and purification may have made the material more acceptable. However, the study did not compare culturally tailored and standard education; the contribution of religious framing should therefore be examined in future research rather than inferred from the present results [22,23].

Knowledge is an important foundation for hygiene practice, but greater knowledge does not automatically lead to sustained behavioural change [10]. Appropriate menstrual self-care also depends on access to water, privacy, menstrual products, and safe disposal facilities [1,4]. Future interventions should therefore combine education with an assessment of the boarding school environment and the practical barriers students face.

Changes in attitudes following the intervention

Mean attitude scores improved immediately after the session, which is broadly consistent with studies showing that menstrual health education can reduce embarrassment and support more favorable attitudes and hygiene practices [24–27]. Education may help normalize menstruation as a biological process and create opportunities for discussion, thereby challenging stigma and restrictive norms [28].

Nevertheless, negative attitudes remained the largest category after the intervention. This distinction between a statistically significant mean change and the categorical distribution is important: the session produced an immediate shift in scores but did not result in a majority of participants being classified as having positive attitudes. Attitudes involve affective and social dimensions and may require repeated exposure, supportive peer and teacher norms, and opportunities to discuss concerns, rather than a single brief session [29].

The findings therefore support regular, developmentally appropriate menstrual health education within the school health program [30]. Such education should be accompanied by supportive institutional arrangements, including access to private and hygienic sanitation, appropriate disposal facilities, and trained staff whom students can approach [31]. Longer follow-up is needed to determine whether changes in knowledge and attitudes are retained and translate into everyday menstrual hygiene practices.

This study has several limitations. The absence of a comparison group means that testing, history, maturation, and other influences cannot be ruled out. The post-test was administered immediately after the 15-minute session, so the study assessed short-term changes rather than

retention or behavior. Outcomes were self-reported, the attitude scale showed modest internal consistency, and participants were from a single boarding school; consequently, the findings may not be generalizable to other *pesantren* or adolescent populations.

4. Conclusion

A brief, context-sensitive menstrual hygiene education session was followed by immediate improvements in knowledge and attitude scores among female students at MTS Darul Huffaz. However, negative attitudes remained common, and the study design does not permit causal conclusions or assessment of sustained change. Islamic boarding schools should provide recurring menstrual health education alongside private sanitation, appropriate disposal facilities, and accessible support from trained staff. Future controlled studies with longer follow-up should assess retention and actual hygiene practices.

Acknowledgment

Given the significant impact of health education through structured media (such as leaflets and audiovisual materials), it is highly recommended that educational institutions, particularly Islamic junior high schools (MTS), integrate regular menstrual hygiene education into their health programs. Providing accessible information will help female adolescents minimize social anxiety, manage menstrual discomfort, and maintain optimal reproductive health practices from an early age.

Conflict of Interest

There is no conflict of interest.

REFERENCES

1. Unicef Indonesia. Buku Manajemen Kebersihan Menstruasi (MKM) dan pencegahan perkawinan anak | Unicef Indonesia. Muslimat NU dan UNICEF Indonesia; 2020. p. 1. Available from: <https://www.unicef.org/indonesia/id/kampung-pengasuhan/laporan/buku-manajemen-kebersihan-menstruasi-mkm-dan-pencegahan-perkawinan-anak>
2. Kemenkes RI. Latbar Menstruasi Siklus yang Normal dan Berbagai Kelainannya. halodoc. 2024. Available from: <https://ayosehat.kemkes.go.id/pentingnya-menjaga-kesehatan-reproduksi-saat-menstruasi>
3. Evans RL, Harris B, Onuegbu C, Griffiths F. Systematic review of educational interventions to improve the menstrual health of young adolescent girls. *BMJ Open*. 2022;12:1–12. <https://doi.org/10.1136/bmjopen-2021-057204>
4. Panda N, Desaraju S, Panigrahy RP, Ghosh U, Saxena S, Singh P, et al. Menstrual health and hygiene amongst adolescent girls and women of reproductive age : a study of practices and predictors , Odisha, India. *BMC Women Health*. 2024;24:1–14. <https://doi.org/https://doi.org/10.1186/s12905-024-02894-7>
5. Fadila RN, Suudi, Sumiatin T, Ningsih WT. Stres dengan siklus menstruasi pada remaja putri di sma negeri 4 tuban. *Jurnal Ilmu Kesehatan*. 2024;3:238–45. Available from: <https://journal.mandiracendikia.com/index.php/JIK-MC/article/view/1369>
6. Unicef Indonesia. Hygiene and Hand Washing Statistics. Unicef. 2025. Available from: <https://www.unicef.org/indonesia/id>
7. Unesco. Menstrual health and hygiene. The World Bank. 2023. p. 92. Available from: <https://worldbank.org>
8. Anbesu EW, Asgedom DK. Menstrual hygiene practice and associated factors among adolescent girls in sub - Saharan Africa : a systematic review and meta - analysis. *BMC Public Health*. *BioMed Central*; 2023;1–14. <https://doi.org/10.1186/s12889-022-14942-8>
9. Pangesti DN, Milindasari P. Gambaran tingkat pengetahuan remaja putri usia 10-19 tahun tentang personal hygiene saat menstruasi. *Tmi Journal Of Tropical Medicine Issues*. 2024;2:18–23. <https://doi.org/10.56922/tmi.v2i1.1232>

10. Wawan A, M Dewi. Teori & Pengukuran Pengetahuan, Sikap Dan Perilaku Manusia. II. Budi J, editor. Yogyakarta: Nuha Medika; 2010.
11. Pakpahan M, Siregar D, Susilawaty A, Tasnim, Ramdany MR, Manurung EI, et al. Promosi Kesehatan & Prilaku Kesehatan. Jakarta: Egc. 2021.
12. Priyoto. Teori Sikap dan Perilaku Dalam Kesehatan. I. J.Budi, editor. YOGYAKARTA: Nuha Medika; 2020.
13. Ene N, Bolarinwa OA, Adedigba C, Oyeleye J, Boboye I, Nwosu U. a mixed-method analysis of knowledge , attitude , and practice of menstrual hygiene management among in-school adolescent girls in a Nigerian city. BMC Public Health. 2024;1–12. <https://doi.org/10.1186/s12889-024-19256-5>
14. Panda N, Desaraju S, Panigrahy RP, Ghosh U, Saxena S, Singh P, et al. Menstrual health and hygiene amongst adolescent girls and women of reproductive age : a study of practices and predictors , Odisha, India. BMC Women Health. 2024;24:1–14. <https://doi.org/https://doi.org/10.1186/s12905-024-02894-7>
15. Arikunto S. Prosedur Penelitian: Suatu Pendekatan Praktik. Jakarta: Rineka Cipta; 2018.
16. Nguyen AMN, Camozzi M, Sommer M. Impacts of a puberty and period education intervention among 9 - to 12 - year - old girls in the New York metropolitan area : a randomized trial. BMC Public Health. BioMed Central; 2025; <https://doi.org/10.1186/s12889-024-21167-4>
17. Basniati A, Sulastri A. Pengaruh Edukasi Personal Hygiene Saat Menstruasi Terhadap Perubahan Pengetahuan dan Sikap Remaja Putri. Jurnal Ilmiah Kesehatan IQRA. 2023;10:215–23.
18. Aniroh U, Mawardika T. Studi Komparasi Pengetahuan dan Sikap tentang Manajemen Kebersihan Menstruasi Sesudah Pemberian Edukasi Menggunakan Media Audiovisual dengan Booklet Print. Indonesian Journal of Midwifery (IJM). 2024;7:115–24. <https://doi.org/10.35473/ijm.v7i1.3212>
19. Agustin LN, Juliastuti D, Royani, Sitanggang TW. Pengaruh Edukasi Digital Dalam Meningkatkan Pengetahuan dan Sikap Tentang Personal Hygiene Saat Menstruasi di SMP Negeri 19 Kota Tangerang Selatan. Jurnal Risat Ilmu Kesehatan. 2026;2:72–9.
20. Martizza M. Pengaruh Media Audio Visual Dan Leafleat Terhadap Pengetahuan Dan Sikap Remaja Putri Tentang Personal Hygiene Saat Menstruasi Di Yayasan Pendidikan Islam (YPI) Darussa ' adah Singah Mulo. Jurnal Multidisiplin Three. 2025;2:xxx–xxx.
21. Hasanah AYR, Hartini L, Efriani R. Pengaruh Media Edukasi Terhadap Pengetahuan dan Sikap Remaja Putri Tentang Hygiene Genitalia Saat Menstruasi di SMP Negeri 2 Kota Bengkulu. Journal of Nursing and Public Health. 2024;12:61–71. <https://doi.org/10.37676/jnph.v12i1.6337>
22. Evans RL, Harris B, Onuegbu C, Griffiths F. Systematic review of educational interventions to improve the menstrual health of young adolescent girls. BMJ Open. 2022;12:1–12. <https://doi.org/10.1136/bmjopen-2021-057204>
23. Ene N, Bolarinwa OA, Adedigba C, Oyeleye J, Boboye I, Nwosu U. a mixed-method analysis of knowledge , attitude , and practice of menstrual hygiene management among in-school adolescent girls in a Nigerian city. BMC Public Health. 2024;1–12. <https://doi.org/10.1186/s12889-024-19256-5>
24. Triamanda RZ, Salawati T, Larasaty ND. Pengembangan Konten Video Animasi Motion Graphic Sebagai Media Promosi Kesehatan Personal Hygiene Menstruasi Bagi Remaja Putri. Jurnal Cakrawala Promkes. 2022;4:40–52. <https://doi.org/10.12928/promkes.v4i1.5466>
25. Villasari A. Fisiologi Menstruasi. Pertama. Tim Stradara Press, editor. Strada Press. Jl. Manila 37 Kota Kediri Jawa Tengah: Strada Press; 2021.
26. Uzunlu Ş, Sayar SE, Çalım GA. Effect of a creative drama-based educational intervention on menstrual attitudes and genital hygiene behaviors in adolescent girls : a randomized controlled trial. BMC Public Health. 2026;26:591. <https://doi.org/https://doi.org/10.1186/s12889-026-26331-6>
27. Chidya R, Kachuma O, Thole T, Banda L, Loewenberger M, Nicholson J. Evaluation of knowledge , attitude , practices and effectiveness of menstrual hygiene interventions in rural schools from Lilongwe ,. BMC Public Health. 2024;1–13. <https://doi.org/https://doi.org/10.1186/s12889-024-18940-w>
28. Azwar S. Sikap Manusia, teori dan pengukurannya. 2nd ed. Yogyakarta: Pustaka Pelajar; 2016.

29. Swarjana IK. Konsep Pengetahuan, Sikap, Perilaku, Persepsi, Setres, Kecemasan, Nyeri, Dukungan Sosial, Kepatuhan, Motivasi, Kepuasan, Pandemi Covid-19, Akses Layanan Kesehatan. 1st ed. Indra R, editor. Yogyakarta: ANDI; 2022.
30. Dian F, Irsan A, Mardhia. Efektivitas Penyuluhan dengan Media Audiovisual terhadap Peningkatan Pengetahuan dan Sikap Personal Hygiene Menstruasi pada Remaja Putri di SMP Negeri 6 Putussibau. *Jurnal Ilmu Kesehatan Indonesia*. 2025;06. <https://doi.org/10.25077/jikesi.v6i3.1516>
31. Åkerman E, Wängborg A, Persson M, Sörensdotter R, Klingberg-allvin M. Navigating menstrual stigma and norms : a qualitative study on young people ' s menstrual experiences and strategies for improving menstrual health. *BMC Public Health*. 2024; <https://doi.org/https://doi.org/10.1186/s12889-024-20936-5>