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The Effectiveness of Education Using Comic Books and Video Media on Knowledge and Skills in Menstrual Hygiene Management Among Adolescent Girls at SMP Negeri 6 Malang

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ABSTRACT

Menstrual hygiene management (MHM) education is needed to support adolescent girls in managing menstruation safely, confidently, and with dignity. This study compared comic book-based and video-based education for improving MHM knowledge and skills. A quasi-experimental two-group pretest–posttest design was used among 56 female students aged 12–14 years at SMP Negeri 6 Malang, selected through proportional stratified random sampling and divided equally between the video and comic book groups. Knowledge was measured using a researcher-modified questionnaire, and skills were assessed using an observation checklist. Paired-samples t-tests examined within-group changes, while independent-samples t-tests compared gain scores between groups. Knowledge improved in the video group by 26.19 points and in the comic book group by 23.33 points; the between-group difference was not significant (mean difference = 2.86, 95% CI -7.76 to 13.47; p = 0.592; Cohen's d = 0.14). Skills improved in the video group by 23.11 points and in the comic book group by 28.45 points; this difference was also not significant (mean difference = -5.34, 95% CI -16.48 to 5.79; p = 0.340; Cohen's d = -0.26). Both media were associated with significant short-term improvements within groups, but the statistical superiority of either medium was not demonstrated.

Keywords: adolescent girls, comic books, health education, menstrual hygiene management, videos

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INTRODUCTION

Menstrual health is a state of physical, mental, and social well-being in relation to the menstrual cycle, rather than merely the absence of disease. Achieving menstrual health requires accurate and timely information, access to appropriate materials and facilities, supportive social environments, and access to care when needed (Hennegan et al., 2021). For adolescent girls, the period around menarche is particularly important because inadequate preparation can contribute to fear, shame, discomfort, and unsafe menstrual practices.

Global gaps remain substantial. In 2024, WHO and UNICEF reported that only 39% of schools worldwide provided menstrual health education, while many schools lacked private changing spaces, water, soap, and disposal facilities (WHO and UNICEF, 2024). In Indonesia, poor MHM knowledge and practices have also been associated with menstruation-related school absence, shame, secrecy, and inadequate support (Davis et al., 2018). These challenges indicate that MHM education should address both conceptual knowledge and practical skills within an enabling school and household environment (Hennegan et al., 2019; UNICEF, 2019).

School-based educational interventions can improve menstrual knowledge and hygiene practices. Studies in Bangladesh, Nepal, and Indonesia have reported improvements following structured menstrual health education, although intervention content, exposure, measurement, and study quality vary considerably (Haque et al., 2014; Nastiti et al., 2023; Ghimire et al., 2024). A systematic review likewise found that educational interventions generally improved menstrual knowledge and that practical skills training supported more hygienic management, with interactive approaches tending to be more engaging than passive information delivery (Evans et al., 2022).

Video and comic book media offer different learning affordances. Video can combine narration, movement, demonstrations, and visual cues, whereas comics provide sequential illustrations that learners can review repeatedly at their own pace. Comic-based education has shown promise for improving MHM knowledge among adolescents (Nadila et al., 2025). However, direct comparisons of video and comic book media for both knowledge and observed MHM skills remain limited, and regional reviews have highlighted weaknesses in allocation procedures, intervention reporting, and outcome measurement (Head et al., 2024).

Therefore, this study aimed to compare changes in MHM knowledge and skills following video-based and comic book-based education among adolescent girls at SMP Negeri 6 Malang.

METHODS

This study employed a quasi-experimental two-group pretest–post-test design to compare the effectiveness of comic book–based and video-based education in improving knowledge and skills related to Menstrual Hygiene Management (MHM) among adolescent girls. The study was conducted at SMP Negeri 6 Malang, Indonesia, from December 2024 to August 2025, while data collection was carried out on August 5–6, 2025.

The study population consisted of 128 female students in grades 7 and 8. The participants were adolescent girls aged 12–14 years who had experienced menarche. The inclusion criteria were female students enrolled in grades 7 or 8, having experienced menstruation, being physically and psychologically able to participate, obtaining permission from their parents or guardians, and being willing to complete all stages of the study. Students who were absent during data collection, were ill, withdrew from the study, or did not complete the pretest, intervention, or post-test were excluded.

A total of 56 participants were included, consisting of 28 participants in the video group and 28 participants in the comic book group. A sensitivity analysis using G*Power version 3.1 showed that a sample of 28 participants per group, with a two-sided significance level of 5% and statistical power of 80%, was sufficient to detect a standardized between-group effect size of approximately 0.76. Therefore, the achieved sample was considered adequate for detecting a moderate-to-large difference between the two educational media.

Participants were selected using proportional stratified random sampling. The number of participants selected from each class was determined proportionally according to the number of eligible female students in that class. Individual participants were subsequently selected using student attendance numbers and a random selection procedure. Random sampling was used to select participants from the study population; however, participants were not randomly assigned to the intervention groups. Group allocation followed the students' existing class distribution while

maintaining an equal number of participants in each group. Consequently, the study was classified as quasi-experimental rather than a randomized controlled trial.

The research instruments consisted of a participant characteristics questionnaire, a household Water, Sanitation, and Hygiene (WASH) checklist, an MHM knowledge questionnaire, and an MHM skills observation checklist. The participant characteristics questionnaire collected information on age, grade, duration since menarche, and maternal educational level. The WASH checklist assessed the availability of clean water, a private and functional toilet, soap and handwashing facilities, and an appropriate facility for disposing of used menstrual materials.

The MHM knowledge questionnaire assessed participants' understanding of menstruation, genital hygiene, handwashing, selection and use of sanitary pads, recommended frequency of changing sanitary pads, and proper disposal of used pads. Each correct response was assigned a score of 1, whereas each incorrect response was assigned a score of 0. The total score was converted into a percentage and categorized as good, fair, or poor according to predetermined scoring criteria.

The MHM skills checklist was used to assess participants' ability to demonstrate the recommended menstrual hygiene procedures. The assessed skills included preparing the required materials, washing hands before and after changing a sanitary pad, removing and wrapping a used pad, correctly attaching a new pad, maintaining genital hygiene, and disposing of the used pad appropriately. Skills were assessed through a standardized simulation using menstrual hygiene materials; no intimate physical examination was conducted. Each correctly demonstrated procedure was scored according to the observation guidelines, and the total score was converted into a percentage and categorized as highly skilled, skilled, moderately skilled, less skilled, or unskilled.

Before data collection, the instruments were reviewed by experts in midwifery, adolescent reproductive health, and health education to evaluate their relevance, clarity, and appropriateness for adolescent girls. The revised instruments were pilot-tested among adolescent girls with characteristics similar to those of the study participants but who were not included in the final study. Ambiguous items and items that did not adequately represent the measured constructs were revised or removed. The final instruments demonstrated acceptable content validity and internal consistency and were considered appropriate for data collection. A standardized scoring guide was used to maintain consistency across assessments.

Data collection began with coordination with the school authorities and identification of eligible students. Participants and their parents or guardians received an explanation regarding the objectives, procedures, potential benefits, voluntary nature, and confidentiality of the study. After parental or guardian consent and participant assent had been obtained, both groups completed the pretest knowledge questionnaire. The participants subsequently completed a simulated MHM skills assessment using the standardized observation checklist.

The video group received MHM education through an educational video containing information about menstruation, genital hygiene, handwashing, appropriate use and frequency of changing sanitary pads, and proper disposal of used pads. The video was presented once for approximately 30 minutes using a projector and speakers in a designated classroom. The researcher provided standardized introductory instructions but did not add educational content beyond that presented in the video.

The comic book group received the same core educational content through the comic book *Haid Pertamaku*. Each participant received a copy of the comic book and was given approximately 30 minutes to read and understand the material under the researcher's supervision. Participants were permitted to review the illustrations and instructions independently during the allocated period. The duration of exposure, learning environment, facilitator involvement, and core MHM content were standardized as far as possible between the two intervention groups.

The educational sessions for the two groups were conducted separately to minimize contamination. Participants were instructed not to exchange educational materials or discuss the intervention content with members of the other group until all post-test assessments had been completed. The comic book and video sessions were delivered in separate rooms and at different scheduled times. The skills assessor used coded observation forms and did not provide additional instruction during the assessment.

Immediately after completion of the intervention, participants completed the post-test using the same MHM knowledge questionnaire. Their MHM skills were reassessed through the same standardized simulation and observation checklist. All questionnaires were checked for completeness immediately after submission. All 56 participants completed the pretest, intervention, and post-test, and no participant was excluded from the final analysis.

Data were entered, cleaned, and analyzed using statistical software. Descriptive statistics were used to summarize participant characteristics, WASH facilities, and pretest and post-test scores. Categorical variables were presented as frequencies and percentages, whereas continuous variables were presented as means and standard deviations.

The normality of the knowledge and skills scores was assessed using the Shapiro–Wilk test. Because the data were normally distributed, parametric statistical tests were applied. A paired-samples *t*-test was used to examine differences between pretest and post-test scores within each intervention group. The individual gain score was calculated by subtracting the pretest score from the post-test score. An independent-samples *t*-test was then used to compare the mean gain scores between the video and comic book groups. Equality of variance was assessed using Levene's test. Between-group findings were reported using the mean difference, 95% confidence interval, *t* statistic, and *p*-value. Cohen's *d* was calculated to estimate the magnitude of the between-group effect. Statistical significance was established at $p < 0.05$, and values generated as 0.000 by the statistical software were reported as $p < 0.001$.

The study was conducted in accordance with ethical principles for research involving human participants. Permission was obtained from the relevant institutional authority and SMP Negeri 6 Malang before data collection. Written informed consent was obtained from the participants' parents or guardians, and assent was obtained from each participant. Participation was voluntary, participants were allowed to withdraw at any stage without penalty, and all collected data were coded and kept confidential.

RESULTS

All 56 participants completed the pretest and post-test assessments. The results are presented as participant characteristics, WASH availability, outcome distributions, within-group pretest-post-test comparisons, and between-group comparisons of gain scores.

Table 1. Menstrual Experience of Adolescent Girls

Category	Frequency (f)	Percentage (%)
Early Phase	42	75%
Middle Phase	14	25%
Total	56	100%

Most respondents were in the early post-menarche phase (0-2 years since menarche), comprising 42 participants (75.0%).

Table 2. Educational Level of Respondents' Mothers

Category	Frequency (f)	Percentage (%)
Basic Education (Elementary School–Junior High School)	5	8.9%
Secondary Education (Senior High School/Vocational High School/Islamic Senior High School)	27	48.2%
Higher Education (College/University)	24	42.9%
Total	56	100.0%

The largest proportion of respondents' mothers had completed secondary education (n = 27; 48.2%), followed by higher education (n = 24; 42.9%).

Table 3. Mean WASH Facilities at Respondents' Homes

Statistic	Value
N	56
Minimum Score	2
Maximum Score	4
Mean	3.93

The mean household WASH score was 3.93 out of 4, indicating that most respondents had access to the assessed basic facilities.

Table 4. Categories of WASH Facility Availability at Respondents' Homes

Category	Frequency (f)	Percentage (%)
Adequate (Score ≥ 4)	54	96.4%
Inadequate (Score < 4)	2	3.6%
Total	56	100.0%

Fifty-four respondents (96.4%) had an adequate WASH score of 4, while two respondents (3.6%) scored below 4.

Shapiro-Wilk tests were conducted for the four gain-score distributions (Table 5).

Table 5. Shapiro-Wilk Normality Tests for Gain Scores

Variable	Statistic	df	p-value
Knowledge gain - Comic book	.972	28	.155
Knowledge gain - Video	.976	28	.052
Skill gain - Comic book	.980	28	.078
Skill gain - Video	.982	28	.054

All Shapiro-Wilk p-values were greater than 0.05, supporting the use of parametric tests for within-group and between-group analyses.

Table 6. Frequency of MHM Knowledge Pretest with Video Intervention

Category	Frequency (f)	Percentage (%)
Good	1	3.6%
Fair	4	14.3%
Poor	23	82.1%
Total	28	100.0%

Almost all respondents were in the poor category, with 23 respondents (82.1%).

Table 7. Frequency of MHM Knowledge Post-test with Video Intervention

Score Category	Frequency (f)	Percentage (%)
Good	12	42.9%
Fair	16	57.1%
Total	28	100.0%

The post-test results showed that 16 respondents (57.1%) were in the fair category, indicating an increase in knowledge after the educational intervention.

Table 8. MHM Knowledge Pretest with Comic Book Intervention

Category	Frequency (f)	Percentage (%)
Good	2	7%
Fair	3	11%
Poor	23	82%
Total	28	100%

Almost all respondents were in the poor category, with 23 respondents (82.1%).

Table 9. Post-Test of MHM Knowledge with Comic Book Intervention

Category	Frequency (f)	Percentage (%)
Good	17	60.7%
Fair	1	3.6%
Poor	10	35.7%
Total	28	100.0%

The post-test results showed that 17 respondents (60.7%) were in the good category, indicating an increase in knowledge after the educational intervention.

Table 10. Pretest of MHM Skills with Video Intervention

Category	Frequency (f)	Percentage (%)
Skilled	1	3.6%
Moderately Skilled	8	28.6%
Less Skilled	18	64.3%
Unskilled	1	3.6%
Total	28	100.0%

Based on the distribution of skills before the intervention, as measured in the pretest, most respondents were in the less skilled category, totaling 18 respondents (64.3%).

Table 11. Post-Test of MHM Skills with Video Intervention

Category	Frequency (f)	Percentage (%)
Highly Skilled	2	7.1%
Skilled	11	39.3%
Moderately Skilled	15	53.6%
Total	28	100.0%

The post-test results for skills showed that 15 respondents (53.6%) were in the moderately skilled category, indicating that the intervention had a positive effect on improving skills.

Table 12. Pretest of MHM Skills with Comic Book Intervention

Category	Frequency (f)	Percentage (%)
Skilled	5	17.9%
Moderately Skilled	7	25.0%
Less Skilled	13	46.4%
Unskilled	3	10.7%
Total	28	100.0%

Before the comic book intervention, the largest category was less skilled (n = 13; 46.4%).

Table 13. Post-Test of MHM Skills with Comic Book Intervention

Category	Frequency (f)	Percentage (%)
Highly Skilled	13	46.4%
Skilled	5	17.9%
Moderately Skilled	5	17.9%
Less Skilled	5	17.9%
Total	28	100.0%

After the comic book intervention, the largest category was highly skilled (n = 13; 46.4%). Inferential testing of the score change is presented in Table 17.

Table 14. Paired-Samples t-Test for Knowledge Scores in the Video Group

Outcome	Pretest Mean ± SD	Post-test Mean ± SD	Mean Gain	t (df)	p-value
Knowledge	45.48 ± 13.94	71.67 ± 8.82	26.19	-8.009 (27)	<0.001

Knowledge in the video group increased from 45.48 ± 13.94 to 71.67 ± 8.82, with a mean gain of 26.19 points (t (27) = -8.009; p < 0.001).

Table 15. Paired-Samples t-Test for Skill Scores in the Video Group

Outcome	Pretest Mean ± SD	Post-test Mean ± SD	Mean Gain	t (df)	p-value
Skills	37.18 ± 10.81	60.29 ± 10.68	23.11	-8.628 (27)	<0.001

Skills in the video group increased from 37.18 ± 10.81 to 60.29 ± 10.68, with a mean gain of 23.11 points (t (27) = -8.628; p < 0.001).

Table 16. Paired-Samples t-Test for Knowledge Scores in the Comic Book Group

Outcome	Pretest Mean ± SD	Post-test Mean ± SD	Mean Gain	t (df)	p-value
Knowledge	44.52 ± 10.11	67.86 ± 19.38	23.34	-5.603 (27)	<0.001

Knowledge in the comic book group increased from 44.52 ± 10.11 to 67.86 ± 19.38, with a mean gain of 23.34 points (t (27) = -5.603; p < 0.001).

Table 17. Paired-Samples t-Test for Skill Scores in the Comic Book Group

Outcome	Pretest Mean ± SD	Post-test Mean ± SD	Mean Gain	t (df)	p-value
Skills	42.26 ± 15.86	70.71 ± 23.38	28.45	-5.846 (27)	<0.001

Skills in the comic book group increased from 42.26 ± 15.86 to 70.71 ± 23.38, with a mean gain of 28.45 points (t (27) = -5.846; p < 0.001).

Table 18. Comparison of Mean Knowledge Gain Scores between Video and Comic Book Groups

Group	Mean Gain ± SD	Mean Difference	t (df)	p-value	95% CI	Cohen's d
Video	26.19 ± 17.30	2.86	0.540 (54)	0.592	-7.76 to 13.47	0.14
Comic book	23.33 ± 22.04					

The mean knowledge gain was 26.19 ± 17.30 in the video group and 23.33 ± 22.04 in the comic book group. The mean difference of 2.86 points was not statistically significant (t (54) = 0.540; p = 0.592; 95% CI -7.76 to 13.47; Cohen's d = 0.14). Therefore, the data did not demonstrate that video was superior to comics for improving knowledge.

Table 19. Comparison of Mean Skill Gain Scores between Video and Comic Book Groups

Group	Mean Gain ± SD	Mean Difference	t (df)	p-value	95% CI	Cohen's d
Video	23.11 ± 14.17	-5.34	-0.962 (54)	0.340	-16.48 to 5.79	-0.26
Comic book	28.45 ± 25.75					

The mean skill gain was 23.11 ± 14.17 in the video group and 28.45 ± 25.75 in the comic book group. The video-minus-comic mean difference was -5.34 points and was not statistically significant (t (54) = -0.962; p = 0.340; 95% CI -16.48 to 5.79; Cohen's d = -0.26). Therefore, the data did not demonstrate that comics were superior to video for improving skills.

DISCUSSION

This study found significant short-term improvements in MHM knowledge and skills within both the video and comic book groups. However, the independent comparisons of gain scores showed no statistically significant difference between the media for either outcome. The numerical pattern was a slightly larger knowledge gain in the video group and a slightly larger skill gain in the comic book group, but the between-group effect sizes were small (|d| = 0.14-0.26) and the confidence intervals included no difference. Consequently, the findings support the usefulness of both media but do not establish the superiority of either one.

The within-group knowledge improvements are consistent with evidence that structured menstrual health education can improve adolescents' understanding of menstrual biology and hygienic practices (Haque et al., 2014; Evans et al., 2022; Nastiti et al., 2023; Ghimire et al., 2024). Video may plausibly support attention and concept comprehension by integrating narration, demonstrations, and visual cues. Nevertheless, the present between-group comparison indicates that any knowledge advantage of video was small and imprecise. This distinction is important because a larger descriptive mean does not, by itself, demonstrate greater effectiveness.

Both groups also showed significant improvement in observed skills. Comics may support practical learning by presenting procedures in a stable, sequential format that can be reviewed repeatedly and at the learner's own pace, whereas video can demonstrate movement and timing. Comic-based MHM education has previously improved adolescent knowledge (Nadila et al., 2025), but evidence directly comparing media for observed skills remains limited. In this study, the larger descriptive skill gain in the comic book group was accompanied by substantial variability and was not statistically different from the video group; thus, the proposed mechanism should be considered a hypothesis for future testing rather than a confirmed explanation.

The high proportion of respondents with adequate household WASH facilities may have supported the translation of education into practical behavior. Menstrual health education is most likely to be useful when learners also have privacy, water, soap, menstrual materials, disposal options, and supportive adults (UNICEF, 2019; WHO and UNICEF, 2024). For school practice, either medium can be selected according to infrastructure, cost, learner preference, and facilitator capacity. A combined approach may be especially useful: video can introduce and demonstrate concepts, while comics can serve as a reusable step-by-step reference.

Several limitations should be considered. The sample was small and drawn from one school, limiting precision and generalizability. The allocation procedure requires explicit author confirmation, and non-random allocation could produce baseline imbalance or confounding. The sample-size calculation was not originally effect-size based and had adequate power only for relatively large between-group effects. The post-test was short term, so retention and sustained behavior change were not assessed. Contamination between groups may have occurred if participants shared information. Knowledge scores may be affected by response bias, while direct observation of skills may be affected by observer and reactivity bias, particularly if observer

training and inter-rater reliability were not established. Future studies should use larger multi-school samples, clearly randomized or cluster-randomized allocation, standardized exposure, validated measures, blinded or standardized observation, and longer follow-up.

CONCLUSION

Both video- and comic book-based education were associated with significant short-term improvements in MHM knowledge and skills among adolescent girls. Although the video group showed a numerically larger knowledge gain and the comic book group showed a numerically larger skill gain, neither between-group difference was statistically significant. Thus, both media are feasible educational options, but superiority of one medium over the other was not demonstrated.

RECOMMENDATION

Schools may integrate video or comic book media into MHM education, preferably with standardized exposure, facilitated discussion, practical demonstration, and access to adequate WASH facilities. Future studies should include larger multi-school samples, transparent random allocation, fully reported and validated instruments, standardized observers, contamination-control procedures, and longer follow-up to assess retention and sustained practice.

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