

The effectiveness of e-booklet and animated story video on young women's knowledge about herbal ingredients for vaginal discharge

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ABSTRACT

Adolescent girls are vulnerable to vaginal discharge (leukorrhea) due to hormonal changes and lack of understanding of reproductive health. Pathological leukorrhea often causes discomfort such as itching, unpleasant odor, and changes in the color of the discharge. According to WHO (2021), about 75% of women in Indonesia have experienced leukorrhea, and 45% have had it more than once. In West Kalimantan, the prevalence reaches 50%. Education using attractive media such as e-booklets and animated story videos can be an enjoyable and effective solution. This study aimed to determine the effectiveness of e-booklets and animated story videos in increasing adolescent girls' knowledge about herbal interventions for leukorrhea. This research employed a quasi-experimental design with a two-group pretest-posttest approach. Samples were selected using proportional random sampling, and data were collected through questionnaires. Data were analyzed using the Mann-Whitney test. The results showed a significant difference between the two groups ($p = < 0,001$), with a higher increase in knowledge among participants who received education through animated story videos compared to e-booklets. Conclusion: Animated story videos are more effective than e-booklets in increasing adolescent girls' knowledge about herbal ingredients for managing leukorrhea.

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1. Introduction

Vaginal discharge, also known as leukorrhea, can be either physiological (normal) or pathological (abnormal). Pathological discharge is often caused by infections from microorganisms such as bacteria, fungi, or parasites, resulting in symptoms like unpleasant odor, itching, and changes in the color or consistency of the fluid (Rao & Mahmood, 2020). In Indonesia's humid tropical climate, the risk of experiencing leukorrhea is increased. According to the World Health Organization, approximately 75% of Indonesian women experience leukorrhea at least once, and 45% experience it more than once—figures significantly higher than in Europe, where the prevalence is only around 25% (World health statistics, 2022). The 2018 Basic Health Research (Riskedas) data reported that about 65% of Indonesian women have experienced leukorrhea, with prevalence reaching up to 50% in West Kalimantan (Organização Mundial de Saúde, 2022).

Adolescent girls are particularly vulnerable to leukorrhea due to hormonal changes and limited knowledge regarding proper genital hygiene (Özdemir et al., 2012; Seyed Ahmadi Nejad et al., 2015). A lack of education may contribute to the high incidence of pathological discharge, which can affect both physical comfort and psychological well-being. Therefore, appropriate educational efforts are essential to enhance knowledge and encourage preventive behaviors (Abdul Hamid Alhassan et al., 2025; Waliyanti & Dewantari, 2021).

Various educational media have been utilized, such as e-booklets and animated storytelling videos. E-booklets provide systematically organized information that can be reviewed repeatedly, while animated videos offer a more engaging and interactive delivery through visuals and audio (Sara et al., 2023). These media are considered effective in delivering information on genital hygiene, signs of pathological discharge, and the use of herbal interventions as safe and natural non-pharmacological interventions.

Several herbal ingredients, including red and green betel leaves, pineapple juice, soursop leaves, and turmeric-tamarind, have been proven to possess antibacterial and antifungal properties and may help reduce leukorrhea symptoms (Lewis, 2013; Siswina et al., 2022). However, despite the availability and proven benefits of these herbal options, awareness among adolescents remains low. (Siswina et al., 2022) reported that around 79% of adolescent girls were not aware of the usefulness of these herbal interventions. This mismatch between existing evidence and low awareness highlights a critical gap, indicating the need to evaluate innovative educational media capable of improving adolescents' understanding.

Therefore, this study aims to examine the effectiveness of e-booklet and animated storytelling video media in increasing adolescent girls' knowledge regarding herbal interventions for preventing pathological leukorrhea at SMA Negeri 1 Sungai Raya. The findings are expected to support the development of accessible, natural-based reproductive health education strategies.

2. Methods

This study employed a quantitative approach with a quasi-experimental design using a two-group pretest-posttest format. The objective was to analyze the effectiveness of e-booklet and animated storytelling video media on adolescent girls' knowledge regarding herbal interventions for leukorrhea at SMA Negeri 1 Sungai Raya. The population consisted of all female students at the school, totaling 550 individuals. The sample was selected using proportional random sampling based on the Slovin formula with a 10% margin of error, resulting in 85 respondents per group. The total sample comprised 170 respondents, divided into two groups: one receiving the e-booklet intervention and the other receiving the animated storytelling video intervention. Samples were proportionally distributed across classes and randomly selected based on inclusion and exclusion criteria. Inclusion criteria included willingness to participate, being in good health, and the ability to communicate. Exclusion criteria included prior exposure to information about leukorrhea.

Primary data were collected using a 16-item multiple-choice questionnaire assessing knowledge related to herbal interventions for leukorrhea. The questionnaire was a self-developed instrument constructed through an extensive literature review. The validation process involved expert judgment by midwifery lecturers, followed by item validity testing using product-moment correlation and reliability analysis, which resulted in a Cronbach's alpha of 0.892. Pretest and posttest were conducted in person using printed questionnaires.

Although the intervention sessions were carried out face-to-face in the same classroom, WhatsApp was used solely as a distribution platform for the educational media (e-booklet and animated storytelling video). This method ensured that all participants could access the materials simultaneously through their personal smartphones while remaining under direct supervision, thereby maintaining consistent engagement among respondents. Participants were given 30 minutes to review the materials and were allowed to view them up to four times.

Data were coded and analyzed using statistical software. The Kolmogorov-Smirnov test indicated a non-normal distribution; therefore, the Wilcoxon test was applied to assess within-group differences,

and the Mann-Whitney test was used to compare effectiveness between groups at a 5% significance level.

This research received ethical approval from the Research Ethics Committee of Poltekkes Kemenkes Pontianak (No. 62/KEPK-PK.PKP/I/2025). All respondents voluntarily provided informed consent. Anonymity and data confidentiality were ensured by coding all collected data to avoid using the respondents' real names.

The study was conducted starting on February 26, 2025, beginning with the preparatory stage, including research permit applications, proposal development, and ethical clearance approval. During the implementation stage, respondents completed the pretest questionnaire, received the intervention based on their group, and then completed the posttest questionnaire. In the final stage, data were processed and analyzed, results were presented in tables and narratives, followed by discussions and conclusions.

This study had several limitations. The large sample size without enumerator support extended data collection time and increased the potential for human error. Furthermore, the questionnaire assessing the history of pathological leukorrhea lacked detailed indicators such as symptom duration, episode frequency, genital hygiene practices, products used, and previous management attempts. More comprehensive instruments are recommended for future studies to generate richer and more representative data.

3. Results

3.1. Respondent Characteristics

The characteristics of the 170 respondents examined in this study included age, menstrual history, history of vaginal discharge, and habits related to maintaining genital hygiene. Such characteristics have the potential to impact research findings, as they are linked to the participants' personal background and their receptiveness to educational content.

Table 1. Frequency Distribution of Respondent Characteristics (n=170)

Characteristics	Amount	
	Frequency	%
Age		
15 years	37	21,8 %
16 years	53	31,2 %
17 years	32	18,8 %
18 years	29	17,1 %
19 years	17	10,0 %
20 years	2	1,2 %
Menstrual History		
Normal	156	91,8 %
Oligomenorrhea	3	1,8 %
Polymenorrhea	11	6,5 %
History of Vaginal Discharge		
Physiological	162	95,3 %
Pathological	8	4,7 %
Intimate Organ Hygiene		
History		
<2x / Day	77	45,3 %
>3x / Day	93	54,7 %

Table 1 shows that 53 respondents (31.2%) were 16 years old and 37 respondents (21.8%) were 15 years old. This age range falls within middle adolescence, a developmental stage marked by enhanced cognitive capacity that supports the comprehension of educational materials, including those related to leukorrhea and herbal interventions.

The majority of respondents had a normal menstrual cycle (91.8%), while the remaining reported menstrual irregularities such as oligomenorrhea (1.8%) and polymenorrhea (6.5%). A normal menstrual cycle typically reflects balanced hormonal conditions, which are relevant to the physiological status of adolescent girls.

Regarding the history of vaginal discharge, most respondents (95.3%) reported experiencing physiological discharge, commonly associated with hormonal changes during puberty. A smaller portion (4.7%) experienced pathological discharge, which requires more attention.

In terms of genital hygiene practices, 54.7% of respondents demonstrated hygienic behavior by cleansing the genital area more than twice daily. However, 45.3% of respondents still exhibited suboptimal hygiene practices. This factor may influence genital health and serves as an important context in interpreting the outcomes of the educational intervention.

3.2. Normality Test

Normality analysis of the knowledge variable was conducted using the Kolmogorov-Smirnov test, with the results presented as follows:

Table 2. Normality Test Results for Adolescent Girls' Knowledge Before and After the E-Booklet and Animated Storytelling Video Interventions

Variabel	Pre-test	Post-test
E-Booklet	0,005	< 0,001
Animated Storytelling Video	0,001	< 0,001

Based on [Table 2](#) above, the results of the normality test for knowledge scores before and after the provision of e-booklet and animated storytelling video interventions showed p-values < 0.05, indicating that the data were not normally distributed. Therefore, the subsequent data analysis was performed using the Wilcoxon signed-rank test to determine the effect of each media, and the Mann-Whitney U test was used to compare the effectiveness between the two educational media.

3.3. The Effect of E-Booklet and Animated Storytelling Video on Adolescent Girls' Knowledge

The results of the normality test for knowledge scores before and after the provision of e-booklet and animated storytelling video showed that the data were not normally distributed. Therefore, the Wilcoxon signed-rank test was used to assess the effect of each media. The results are presented in the following table:

Table 3. Wilcoxon Test Results of Adolescent Girls' Knowledge Before and After E-Booklet and Animated Storytelling Video Interventions

Variabel	Variabel	n	Min-Max	Median	SD	p
E-Booklet	Pretest	85	31-88	56,25	13,239	< 0,001
	Posttest	85	56-100	81,25	9,594	
Animated Storytelling Video	Pretest	85	19-88	56,25	15,328	< 0,001
	Posttest	85	69-100	87,50	7,541	

Based on [Table 3](#), the Wilcoxon test results for both the e-booklet and the animated storytelling video showed p-values < 0.05. This indicates that the provision of both educational media had a significant effect on increasing adolescent girls' knowledge regarding herbal interventions for leukorrhea.

3.4. The Effectiveness of E-Booklet and Animated Storytelling Video on Adolescent Girls' Knowledge

The results of the Wilcoxon test showed that both the e-booklet and animated storytelling video had a significant effect on the knowledge of adolescent girls, with p-values < 0.05. To further assess the effectiveness between the two media, the Mann-Whitney U test was used, as the data were not normally distributed. The results are presented in the following table:

Table 4. Effectiveness of E-Booklet and Animated Storytelling Video on Adolescent Girls' Knowledge

Variable	Variable	N	Mean	Mean Difference	Mean Rank	p
E-Booklet	Pretest	85	55,03	23,07	70,36	< 0,001
	Posttest	85	78,90			
Animated Storytelling Video	Pretest	85	53,09	33,51	100,64	
	Posttest	85	86,60			

Based on [Table 4](#), the Mann-Whitney test showed a significant difference in effectiveness between the two media. The animated storytelling video produced a greater mean difference (33.51) than the e-booklet (23.07), indicating that the animated storytelling video was more effective in increasing adolescent girls' knowledge about herbal interventions for leukorrhea.

Furthermore, the mean difference and mean rank scores indicate that the animated storytelling video group achieved higher values compared to the e-booklet group. This suggests that the animated storytelling video was more effective in enhancing adolescent girls' knowledge about herbal interventions for leukorrhea than the e-booklet.

4. Discussion

A total of 170 female students participated in this study. The intervention involved providing health education using two types of media: an e-booklet and an animated storytelling video focusing on herbal interventions for leukorrhea. A questionnaire was administered before and after the health education intervention, beginning with a pre-test, followed by a 30-minute period to read the e-booklet or watch the animated video (up to four times, with a total duration of 30 minutes), and concluded with a post-test.

The e-booklet is defined as an educational medium in the form of a digital book designed to deliver concise and structured information in an electronic format. It typically contains systematically organized material or guidance that is easy for readers to understand. Its digital nature allows the e-booklet to be accessed through various electronic devices such as computers, tablets, or smartphones, offering advantages in terms of distribution and interactivity ([Abdul Hamid Alhassan et al., 2025](#); [Mancone et al., 2024](#)).

The animated storytelling video is a form of audiovisual media. It combines elements of narration, moving illustrations, sound, and text to present the material in a systematic and easily understandable manner. As a digital medium, the animated video can be accessed on various electronic devices such as computers, tablets, or smartphones, and it offers advantages in both message delivery and reach ([Saha et al., 2022](#)).

The data obtained were analyzed and presented in tables that served as the basis for this discussion. Based on Table 1, the majority of respondents were 16 years old (31.2%), an age categorized as middle adolescence. At this developmental stage, cognitive maturity allows for more effective information processing. Most respondents had a normal menstrual cycle (91.8%), indicating a balanced reproductive hormonal status that supports receptiveness to reproductive health information. Additionally, 95.3% of respondents reported experiencing physiological leukorrhea, reflecting that this condition was already part of their personal experience.

This made the educational topic relevant and relatable to the students' lived experiences. Regarding genital hygiene practices, 54.7% of respondents reported cleaning their genital area more than twice a day. This reflects an initial awareness of reproductive health, forming a solid foundation for absorbing the educational content provided.

The results of the normality test in Table 2 showed that both pre-test and post-test data from the two media had p -values < 0.05 , indicating that the data were not normally distributed. Therefore, non-parametric analysis was used, including the Wilcoxon signed-rank test to determine the effect of each medium and the Mann-Whitney U test to compare the effectiveness between groups.

4.1. The Effect of E-Booklet on Adolescent Girls' Knowledge of Herbal Interventions for Leukorrhea

Based on the Wilcoxon test results presented in Table 3, the provision of education using e-booklet media showed a significant effect on improving adolescent girls' knowledge about herbal interventions for leukorrhea, with a p -value < 0.05 . This indicates a difference in knowledge scores before and after the intervention.

These findings are in line with the study by ([Petro et al., 2025](#)), which reported an increase in adolescent girls' knowledge regarding leukorrhea prevention after receiving education through e-booklets. Similarly, ([Cunningham et al., 2020](#)) also found a significant difference in knowledge about leukorrhea before and after health education delivered via e-booklet.

As a digital medium, the e-booklet offers easy access, flexible study time, and systematically organized content is easy to understand. These characteristics align well with adolescents' learning styles, which tend to be independent and adaptive to technology. Therefore, the e-booklet is proven to be a significantly effective educational tool for enhancing adolescent girls' knowledge in the context of reproductive health.

4.2. The Effect of Animated Storytelling Video on Adolescent Girls' Knowledge of Herbal Interventions for Leukorrhea

The Wilcoxon test results in Table 3 for the animated storytelling video group also showed a significant increase in knowledge, with a p-value < 0.05. This indicates that educational intervention through animated storytelling videos had a notable impact on improving adolescent girls' knowledge.

These findings are consistent with the study by (Mariana, 2024) which demonstrated that health education using audiovisual media was effective in enhancing students' knowledge about leukorrhea prevention. Similarly, the study by (Wahdi et al., 2020) also confirmed that educational videos had a significant effect on knowledge levels before and after the intervention.

Animated storytelling videos deliver information through engaging visual and narrative approaches, making it easier for respondents to understand the content. The combination of sound, motion graphics, and storylines relevant to adolescents' daily lives captures attention and enhances information retention. Therefore, animated storytelling videos are considered an effective medium for delivering health education materials, especially for adolescent audiences.

4.3. The Effectiveness of E-Booklet and Animated Storytelling Video on Adolescent Girls' Knowledge of Herbal Interventions for Leukorrhea

Based on the Mann-Whitney U test results in Table 4, the p-value was < 0.05, indicating a significant difference in effectiveness between the two media. The animated storytelling video yielded a higher mean rank and greater average increase in knowledge scores compared to the e-booklet.

These findings are consistent with a study by (Nur, 2020), which concluded that video media was more effective than booklets in improving knowledge related to reproductive health. Similarly, (World Health Organization, 2019) found that both video and booklet interventions significantly influenced adolescent girls' knowledge regarding feminine hygiene during menstruation, with video proving more effective in enhancing attitudes within reproductive health contexts.

In line with this, (Ragamin et al., 2022b) demonstrated that animated video media was effective in increasing adolescent girls' knowledge on personal hygiene during menstruation. Furthermore, (Sögüt et al., 2022) reported that video media was highly effective in enhancing adolescent girls' understanding of menstrual hygiene management, with video showing a higher level of effectiveness.

(Ragamin et al., 2022a) also emphasized that health education positively influences knowledge, attitudes, and behaviors in the prevention of pathological leukorrhea among adolescent girls. These findings are further supported by (Hay, 2018), who found that audiovisual media as a tool for reproductive health education significantly improved knowledge scores ($p = 0.000$) and attitude scores ($p = 0.011$) compared to booklet media.

However, not all studies demonstrate the superiority of video-based media. Research by (Wahdi et al., 2020) showed that e-booklets were effective in increasing adolescent girls' knowledge regarding the prevention of pathological leukorrhea. Similarly, the study by (Approach & Community-based, 2019) reported a significant improvement in knowledge before and after the provision of health education using e-booklet media. These contrasting findings indicate that text-based media such as e-booklets can still produce substantial learning outcomes, depending on learner characteristics, preferred learning styles, and the suitability of the educational media.

The researcher assumes that the effectiveness of animated storytelling videos in increasing knowledge among adolescent girls is influenced by the combination of visual, auditory, and narrative elements that successfully capture attention and enhance comprehensive understanding. The content is presented through everyday scenarios that are relatable to adolescents, which increases emotional engagement and relevance. Therefore, selecting media that align with learners' characteristics is

crucial for the success of health education programs, particularly in promotive and preventive efforts among adolescents.

5. Conclusion

Reproductive health education delivered through e-booklets and animated storytelling videos has proven effective in increasing adolescent girls' knowledge regarding herbal interventions for leukorrhea. The e-booklet successfully improved understanding after the educational intervention, while the animated storytelling video produced an even greater increase in knowledge. This indicates that animated storytelling videos are more effective than e-booklets in enhancing adolescents' comprehension of reproductive health topics.

These findings have several practical implications. For schools, animated storytelling videos can be integrated into routine health education sessions, extracurricular programs, or digital literacy classes to present sensitive topics in a more engaging and comfortable manner for students. For health workers, the use of story-based audiovisual media can serve as an efficient tool during adolescent health counseling, community outreach, and school-based health promotion activities. For policymakers, the effectiveness of animated videos supports the development of standardized, technology-based educational materials that can be distributed widely to improve adolescent reproductive health literacy. Therefore, incorporating animated storytelling videos into adolescent health education strategies is highly recommended to ensure consistent, attractive, and impactful health learning experiences.

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