



Exploring the Benefits of Kusir as a Complementary Effort to Alleviate Fluor Albus in Adolescent Girls

Yeni Nur Sa'diyah¹, Dwi Riyan Ariestantia²

¹Bachelor Of Midwifery, Stikes Mutiara Mahakam Samarinda, Indonesia

²Megister Of Midwifery, Stikes Mutiara Mahakam Samarinda, Indonesia

*Corresponding Author: Yeni Nur Sa'diyah

Email: yeninursadiyah18@gmail.com



Article Info

Article history:

Received 22 November 2025

Received in revised form 10
December 2025

Accepted 28 December 2025

Keywords:

Albus Flour

Teenage girl

Turmeric and Betel

Abstract

Fluor albus or vaginal discharge is a common reproductive health problem among adolescent girls. When abnormal, it can interfere with daily activities, cause discomfort, and potentially lead to more serious health issues if left untreated. Despite this, many adolescents are reluctant to report symptoms to parents or health professionals because the issue is considered sensitive. This situation highlights the need for safe, acceptable, and effective complementary therapies to manage fluor albus in adolescents. This study aimed to examine the effectiveness of the traditional herbal medicine KUSIR, made from turmeric and betel leaf, in reducing the severity of fluor albus among adolescent girls. The study employed a quantitative approach using a quasi-experimental pretest posttest control group design. A total of 64 adolescent girls participated and were divided into an intervention group receiving KUSIR herbal treatment and a control group without intervention. Data were analyzed using the Wilcoxon test to examine changes before and after treatment and the Mann Whitney U test to compare outcomes between groups. The findings showed a clear reduction in the severity of fluor albus in the intervention group compared to the control group. Mann Whitney U analysis indicated a significant difference in posttest scores, with a higher mean rank in the intervention group than in the control group. The Wilcoxon test confirmed that all participants in the intervention group experienced a decrease in symptoms. KUSIR herbal treatment is effective as a complementary therapy for reducing fluor albus severity in adolescent girls. Turmeric and betel leaf offer a natural, affordable, and acceptable alternative for adolescent reproductive health care.

Introduction

Fluor albus, or vaginal discharge, is a common condition among adolescent girls, especially during puberty (Nisa & Yudha, 2024; Husni et al., 2023; Safitri et al., 2025; Khoiroh et al., 2025). While often considered normal, excessive vaginal discharge accompanied by an unpleasant odor, itching, or discoloration can indicate an infection that requires medical treatment. In adolescent girls, this condition affects more than just the physical aspects.

Both health and psychological aspects, including decreased self-confidence or impaired learning (Hidayanti & Pascawati, 2021; Abu et al., 2024). Vaginal discharge can also be caused by poor hygiene practices, such as infrequently changing underwear, washing from back to front, or using unclean water, which can encourage the growth of pathogenic microorganisms that cause infection (Jana, 2024; GiteAnamika, 2025).

Sheeley (2004) said that, Physiological vaginal discharge is usually clear to whitish, odorless, and not accompanied by itching. However, vaginal discharge can become pathological if caused by a fungal, bacterial, or parasitic infection, characterized by discoloration, an unpleasant odor, and itching or burning around the genital area (Mugdadi et al., 2022; Zahara et al., 2020; Mashoudy et al., 2025). The World Health Organization (WHO) notes that approximately 75% of women worldwide experience abnormal vaginal discharge at least once in their lifetime, with more than 40% experiencing it for the first time during adolescence.

In Indonesia, the prevalence of pathological vaginal discharge is also relatively high. The 2018 Basic Health Research (Riskesdas) data reported that approximately 37.5% of adolescent girls experienced vaginal discharge that interfered with their daily activities. In East Kalimantan Province, a 2022 report from the Health Office indicated that approximately 32% of high school students had experienced vaginal discharge in the previous year (Hamida, 2024; Saadah et al., 2024). In this context, the use of traditional medicinal plants such as turmeric (*Curcuma longa*) and betel leaf (*Piper betle*) holds great potential.

Empirically, Indonesians have long used boiled betel leaf to cleanse the female genital area due to its phenol and antiseptic content (Tamar & Murbiah, 2024; Manaf & Novemi, 2024). Similarly, turmeric contains curcumin, which has anti-inflammatory, antifungal, and antibacterial properties. Research has (Akarapongsawad et al., 2024) shown that betel leaf extract can inhibit the growth of *Candida albicans* by up to 85%, while a study by (Hanni & Yaroh, 2024) also provides similar supporting evidence. It reports the effectiveness of turmeric extract in suppressing *Staphylococcus aureus* bacteria, which cause vaginal discharge.

However, research combining these two ingredients as a complementary therapy is still very limited, especially among adolescent girls (Edwards et al., 2013; Kemper et al., 2008; Kaley-Isley et al., 2010). Therefore, exploring the benefits of the combination of turmeric and betel leaf, referred to as KUSIR in this study, is crucial, particularly in efforts to reduce the incidence of fluor albus among students. Based on initial observations conducted by researchers at SMAN 1 Batu Engau, there were 450 female students from grades 10, 11, and 12, and the majority of them reported experiencing vaginal discharge before and after menstruation.

Treatment for vaginal discharge generally involves the use of antifungal or antibiotic medications (Rao & Mahmood, 2020). However, long-term use can lead to side effects such as microbial resistance and disruption of normal reproductive flora (Risviana & Anggraeni, 2024). Furthermore, access to quality medical care in rural areas like Batu Engau remains limited in terms of facilities and cost. This highlights the need to develop effective, safe, and affordable alternative or complementary treatments (Aldriana et al., 2023; Herman et al., 2005; Wardle et al., 2012; Barnes, 2003).

To date, research on complementary treatments for fluor albus has been largely conducted in adult women, while specific data on adolescent girls, particularly in East Kalimantan, remains limited. Furthermore, studies examining the combination of turmeric and betel leaf as a single intervention are rare (Novelia & Tiara, 2023). This indicates a gap in the literature that needs to be addressed to provide strong scientific evidence regarding the effectiveness of KUSIR as a complementary therapy for adolescents.

Furthermore, promotive and preventive approaches in school settings are still less than optimal in addressing fluor albus complaints. Therefore, introducing easily accessible and affordable local herbal remedies could be a relevant strategy for implementation among students (Agyei-Baffour et al., 2017; Clement et al., 2005). Research Variables: This study includes two variables, with the independent variable as one of them: Administration of the KUSIR formulation (a combination of turmeric and betel leaves). Dependent variable: The occurrence of fluor albus, measured through frequency, color, odor, and subjective complaints experienced by adolescent girls.

Objective: This study investigated the potential benefits offered by the combination of turmeric and betel leaf (KUSIR) as a complementary effort in reducing fluor albus in female students of SMA Negeri 1 Batu Engau. Specifically, this study aimed to: (1) Determine the efficacy of administering the KUSIR formulation in reducing fluor albus symptoms; (2) Provide evidence-based recommendations for school and adolescent health services.

Research Problem: Based on the background that has been explained, the research problem formulated in this study is whether the combination of turmeric and betel leaves (KUSIR) is effective in reducing fluor albus in female adolescents at SMA Negeri 1 Batu Engau. Thus, this study aims not only to provide a deeper understanding of the occurrence of vaginal discharge among adolescent girls, but also to identify key influencing factors, such as the importance of maintaining genital hygiene. The results will form the basis for formulating recommendations for the use of complementary therapies to address vaginal discharge among adolescent girls.

Methods

Research Design and Location

This study used a quasi-experimental design with a pretest–posttest control group approach, which aimed to assess the effectiveness of the herbal concoction KUSIR (a combination of turmeric and betel leaves) as a complementary therapy in reducing fluor albus symptoms in adolescent girls. The study was conducted at SMA Negeri 1 Batu Engau, Paser Regency, East Kalimantan Province, from April to May 2025.

Population and Sample Size

The population in this study was all female students at SMA Negeri 1 Batu Engau who were in their teens and reported experiencing vaginal discharge. The sample size was determined using the Slovin formula with a margin of error of 10%, resulting in a sample size of 64 respondents. The 10% margin of error was chosen based on population limitations, the single-site study context, and the operational feasibility and ethics of research on school-aged adolescents. The researchers acknowledge that a smaller margin of error ($\leq 5\%$) could improve statistical precision and clinical sensitivity, but this approach was chosen to ensure affordability of recruitment and sustainability of the intervention in school settings. These limitations were taken into account in the interpretation of the results and are recommended for further research with a broader scope.

Sampling Techniques

The sampling technique used was purposive sampling, namely the deliberate selection of respondents based on predetermined inclusion and exclusion criteria, with the aim of ensuring that the sample has clinical relevance to the variables studied.

Inclusion and Exclusion Criteria

Inclusion criteria: (1) Young women aged 15–18 years; (2) Active student of State Senior High School 1 Batu Engau; (3) Report experiencing vaginal discharge with at least two of the following subjective symptoms: change in discharge color, unpleasant odor, itching, or discomfort in the genital area; (4) Not currently using antifungal medications, antibiotics, or other vaginal therapies in the last 14 days; (5) Willing to participate in the entire research series and sign the informed consent. **Exclusion criteria:** (1) Light physiological vaginal discharge without significant accompanying complaints; (2) Menstruating at the time of pretest or posttest data collection; (3) Have a history of allergies to turmeric or betel leaves; (4) History of severe genital infections requiring intensive medical treatment during the study period.

Group Division and Initial Equality

A total of 64 respondents who met the inclusion criteria were divided into two groups: the intervention group (n = 32) and the control group (n = 32). Group allocation was carried out using a non-random allocation approach based on equivalence of initial characteristics, in accordance with the principles of a quasi-experimental design. To minimize selection bias, a baseline equivalence analysis was conducted based on the pretest fluor albus severity scores and key demographic characteristics of the respondents. The analysis showed no statistically significant differences between the intervention and control groups at baseline, thus the two groups were considered homogeneous and worthy of analytical comparison.

Intervention Procedure

The intervention group received the KUSIR herbal concoction, a combination of turmeric and betel leaves, for seven consecutive days. The concoction was prepared as a decoction according to the same standards for all participants, and its use was accompanied by education on genital hygiene and adolescent reproductive health. The control group received only reproductive health and genital hygiene education without herbal remedies. During the study period, respondents in both groups were asked not to use any additional therapies related to vaginal discharge management.

Instruments and Measurements

The incidence and changes in vaginal discharge symptoms were measured using a structured questionnaire that assessed vaginal discharge frequency, color, odor, itching, and subjective discomfort. This instrument underwent internal validity and reliability testing, with all items demonstrating item-total correlations above the minimum required threshold and Cronbach's alpha values >0.7, indicating good internal consistency. The researchers recognize that self-report measures have limitations in clinically distinguishing physiological from pathological fluor albus. Therefore, the questionnaire focused on subjective symptoms perceived as interfering with respondents' activities and comfort, which are relevant in the context of promotive and preventive interventions in the school environment. This limitation was carefully considered in interpreting the study results.

Data analysis

Data were analyzed using statistical software. Normality testing was performed using the Shapiro–Wilk test and showed that the data were not normally distributed. Therefore, further analysis used non-parametric tests. The Mann–Whitney U test was used to compare posttest results between the intervention and control groups, while the Wilcoxon Signed Rank test was used to assess changes in pretest and posttest scores within groups. The significance level was set at $p < 0.05$.

Ethical Considerations

This study received approval from the school and was conducted in accordance with ethical principles of health research. All respondents were provided with an explanation of the study's purpose, procedures, benefits, and potential risks, and participated voluntarily with written consent.

Results and Discussion

Validity and Reliability Test

Validity testing is used intentionally to assess the extent to which a questionnaire measures what it is intended to measure. Furthermore, reliability testing measures the questionnaire's consistency as an indicator of a variable. The table below outlines the findings from the validity and reliability assessments:

Table 1. Validity and Reliability Test Results

Albus Flour (n= 64)	calculated t > t table (1.697)		Alpha Cronbatch > 1.697	
Statement 1	0.622	Legitimate	0.812	Reliable
Statement 2	0.713	Legitimate		
Statement 3	0.675	Legitimate		
Statement 4	0.688	Legitimate		
Statement 5	0.731	Legitimate		
Statement 6	0.655	Legitimate		
Statement 7	0.601	Legitimate		
Statement 8	0.723	Legitimate		
Statement 9	0.669	Legitimate		
Statement 10	0.704	Legitimate		
Statement 11	0.711	Legitimate		
Statement 12	0.677	Legitimate		

Source: Data processed by the author, 2025

Validity testing is conducted to determine the extent to which the items in a questionnaire can help measure what they are intended to measure. In this study, validity testing was conducted on 12 items related to the occurrence of fluor albus among adolescent girls. Based on the results of this test, all statement items were found to have a higher r-count value compared to the r-table, namely 0.444 (with 20 respondents and a significance level of 5%). The r-count values ranged from 0.601 to 0.731, indicating that each item had a strong correlation with the total score.

Following are the detailed results of the validity test: (1) The statement items related to the experience of fluor albus, including frequency, color, odor, and accompanying symptoms (itching, pain, swelling), had an r-calculated value above 0.6, which indicates good validity; (2) Items related to risk factors, such as frequency of changing sanitary napkins, methods of cleaning the genital area, and use of cleansing soap, also showed valid results; (3) Items assessing the impact of fluor albus on daily activities and management efforts undertaken by respondents were also valid, with r-calculated values above 0.6. Thus, it can be concluded that all items in the questionnaire have good validity and are suitable for use as a measuring tool in this study.

Univariate Analysis

Univariate analysis showed that the respondents' demographic characteristics, including age, grade level, and underwear changing habits, were relatively balanced between the intervention and control groups. These findings provide a picture of the alignment of the respondents' baseline characteristics, but are not intended to imply clinical or behavioral equivalence directly affecting fluor albus symptoms. Therefore, the univariate analysis in this study is positioned as a description of the respondents' profiles and not as a basis for causal attribution of intervention outcomes. The results of the analysis are presented below:

Table 2. Results of Characteristics Distribution Based on Age

Age (Year)	Frequency (Intervention)	Percentage (%)	Frequency (Control)	Percentage (%)
15	6	18.75%	3	9.38%
16	7	21.88%	11	34.38%
17	12	37.50%	11	34.38%
18	7	21.88%	7	21.88%

Total	32	100%	32	100%
--------------	-----------	-------------	-----------	-------------

Source: Data processed by the author, 2025

Table 3. Distribution of Characteristics by Class

Class	Frequency (Intervention)	Percentage (%)	Frequency (Control)	Percentage (%)
X	12	37.50%	11	34.38%
XI	13	40.62%	14	43.75%
XII	7	21.88%	7	21.88%
Total	32	100%	32	100%

Source: Data processed by the author, 2025

Table 4. Distribution of Characteristics Based on Frequency of Changing Underwear

Frequency of changing underwear	Frequency (Intervention)	Percentage (%)	Frequency (Control)	Percentage (%)
1 time/day	4	12.50%	4	12.50%
2 times a day	15	46.88%	14	43.75%
3 times a day	13	40.62%	14	43.75%
Total	32	100%	32	100%

Source: Data processed by the author, 2025

Based on the results of the analysis conducted to help determine the distribution of respondent characteristics according to age, education level, and underwear changing habits, the findings showed a relatively balanced profile between the intervention group and the control group. In the intervention group, the majority of respondents were 17 years old, totaling 12 participants (37.50%), followed by those aged 16 and 18 years old with 7 participants each (21.88%), and 6 participants aged 15 years old (18.75%). Meanwhile, in the control group, the majority of respondents were 16 and 17 years old, with 11 participants each (34.38%), followed by 7 participants aged 18 years old (21.88%), and 3 participants aged 15 years old (9.38%). In terms of grade level, most of the respondents in the intervention group were from grade XI, with a total of 13 participants (40.62%), followed by grade X with 12 participants (37.50%), and grade XII with 7 participants (21.88%). A similar distribution was observed in the control group, where grade XI also dominated with 14 participants (43.75%), followed by grade X with 11 participants (34.38%), and grade XII with 7 participants (21.88%).

Regarding underwear changing habits, the majority of female adolescents in both the intervention and control groups reported changing their underwear two to three times a day. In the intervention group, 15 respondents (46.88%) reported changing their underwear twice a day, while 13 respondents (40.62%) changed it three times a day. Only 4 respondents (12.50%) changed their underwear once a day. Meanwhile, in the control group, 14 respondents (43.75%) changed their underwear twice a day, and the same number (14 respondents or 43.75%) changed it three times a day. Only 4 respondents (12.50%) reported changing their underwear once a day. The balanced distribution of age, grade level, and underwear changing habits between the two groups indicates that the baseline characteristics of the respondents were relatively similar. This is important to ensure that any differences in outcomes observed after the intervention are not due to differences in respondents' baseline characteristics, but rather to the treatment or intervention provided.

Bivariate Analysis

To identify whether the dataset is normally distributed, the Shapiro–Wilk test is used. Normal distribution of data is an important assumption in applying parametric statistical tests. Therefore, before conducting further analysis, a normality test must be performed on the data used.

Pre-Test Normality Test

Table 5. Results of Pre-Test Normality Test

Post-Research Test		Shapiro-Wilk		
		Statistics	df	Signature.
Respondents	Heavy	0.446	13	0
	At the moment	0.566	18	0
	Light	0.534	33	0

Source: Data processed by the author, 2025

The normality test showed that the significance value (Sig.) for the intervention and control groups was 0.000, all of which were less than the significance level ($\alpha = 0.05$). The Shapiro–Wilk statistic value was also significantly lower than 1, namely 0.634 for respondents with severe fluor albus, 0.635 for respondents with moderate fluor albus, and 0.418 for respondents with mild fluor albus. These findings indicate that the data in each group deviated significantly from the normal distribution.

Post-test Normality Test

Table 6. Post-Test Normality Test Results

Post-Research Test		Shapiro-Wilk		
		Statistics	d	Signature.
Respondents	Heavy	0.446	13	0
	At the moment	0.566	18	0
	Light	0.534	33	0

Source: Data processed by the author, 2025

Post-test data from all respondent groups (severe, moderate, and mild) were not normally distributed, as indicated by a significance value of $p < 0.05$ in the Shapiro–Wilk test. Therefore, it is recommended to use non-parametric analysis in subsequent statistical tests. Data normality testing was performed using the Shapiro–Wilk test on the total fluor albus severity score, which was the main dependent variable in the inferential analysis. The test results indicated that the score distribution did not meet the assumption of normality, so further analysis used a non-parametric statistical approach. Thus, the Wilcoxon Signed Rank test was used to assess changes in pretest and posttest scores in each group, while the Mann–Whitney U test was used to compare posttest scores between the intervention and control groups.

Mann Whitney U Test Analysis

To ensure the clinical equivalence of initial conditions, a comparison of the pretest scores of fluor albus symptom severity between the intervention group and the control group was conducted using the Mann–Whitney U test. The results of the analysis showed that there was no statistically significant difference in the initial severity scores between the groups ($p > 0.05$), so that both groups were assessed to have comparable levels of symptom severity before the intervention was given.

Table 7. Mann Whitney U Test Results

Respondents		N	Average Rating	Number of Ratings
Post-Research Test	Intervention Group	32	41.45	1326.5
	Control Group	32	23.55	753.5
	Total	64		

Source: Data processed by the author, 2025

Post-test analysis using the Mann–Whitney U test showed a clear difference in mean ratings between the groups. The intervention group (n = 32) had a mean rating of 41.45 and a total rating of 1326.50. In comparison, the control group (n = 32) had a mean rating of 23.55 and a total rating of 753.50. This significant difference in mean ratings indicates that the post-test scores in the intervention group showed higher results overall compared to the control group, indicating that the intervention positively affected their post-test performance. Since the Shapiro–Wilk test indicated that the data were not normally distributed, the non-parametric Mann–Whitney U test was used instead of the t-test. With a p-value below 0.05, as shown in the analysis table, it can be concluded that there is a statistically significant difference between the intervention and control groups after treatment. Thus, the intervention significantly improved post-test results among participants compared to the untreated control group.

Table 8. Mann Whitney U Test Results

Statistical Test	Post-Research Test
Mann-Whitney University	225.5
Wilcoxon W	753.5
Z	-4.216
Asymptomatic . Sig. (2-tailed)	0

Source: Data processed by the author, 2025

The Mann–Whitney U test on the post-test data yielded a U value of 225.500, a Z score of –4.216, and an Asymp. Sig. (2-tailed) of 0.000. Since these values are well below the 0.05 significance level, this confirms the existence of a statistically significant difference between the two groups based on the post-test results. The negative Z-value (–4.216) indicates that the direction of the difference indicates that the intervention group obtained a higher post-test score than the control group. This finding is consistent with the results of the Ranks test, which showed that the intervention group's average rank (41.45) exceeded the control group's average rank (23.55). Based on these findings, it can be concluded that the intervention had a significant impact on improving respondents' post-test results. In other words, the intervention was proven effective and had a positive impact on learning achievement or the parameters measured after the treatment was administered.

Wilcoxon Analysis Test

Table 9. Results of the Wilcoxon Analysis Test

		N	Average Rating	Number of Ratings
Final Test - Pre-Test	Negative Rating	0 ^a	0	0
	Positive Rating	31 ^b	16	496
	Tie	33 ^c		
	Total	64		

Source: Data processed by the author, 2025

A Wilcoxon Signed Rank Test comparing pre- and post-test scores from 64 respondents found that 31 participants (48.4%) experienced an increase in their scores, with a mean rating of 16.00 and a total rating of 496.00. The remaining 33 respondents (51.6%) showed no difference in their scores, and none recorded a decrease (negative rating = 0). This indicates that the intervention did not result in a decrease in scores, with nearly half experiencing an increase and the rest remaining unchanged. Since no respondents experienced a decline in their scores and many showed improvement, the intervention can be considered beneficial in improving post-test results. A Wilcoxon test further confirmed that the program effectively improved participants' performance or understanding relative to their pre-test levels.

Table 10. Results of the Wilcoxon Analysis Test

	Final Test - Pre-Test
Z	-5.126 ^b
Asymptomatic . Sig. (2-tailed)	0

Source: Data processed by the author, 2025

Based on the results of the Wilcoxon Signed Rank test, a Z value of -5.126 was obtained with a significance value (Asymp. Sig. 2-tailed) of 0.000. This significance value is smaller than the alpha threshold ($\alpha = 0.05$), which indicates a statistically significant difference in scores in both the pre-test and post-test. A negative Z value indicates that the change in scores occurred in the direction of improvement, meaning that the post-test score was higher than the other scores. These statistical results indicate that the intervention provided had a significant impact on improving post-test results. Therefore, the treatment or program implemented can be considered effective in improving respondents' knowledge or skills compared to their pre-intervention condition.

Respondent Characteristics

The participant profile in this study consisted of 64 adolescent girls divided into an intervention group and a control group. All respondents were adolescent girls aged 15 to 18 years old, currently attending high school (grades 10, 11, and 12) and generally had the habit of changing their underwear two to three times a day. The selection of adolescent girls as respondents was deemed appropriate because the incidence of fluor albus in this population is relatively high and requires early treatment. This aligns with research (Suyenah & Dewi, 2022) indicating that fluor albus in adolescents is often difficult to treat because many are reluctant to report the condition to their parents or healthcare providers.

Furthermore, adolescence is a transitional phase toward adulthood, marked by various physical and hormonal changes, including those affecting the reproductive system. These changes make young women more vulnerable to reproductive health issues such as vaginal discharge. Limited knowledge about genital hygiene, limited education about reproductive health, lifestyle influences, and environmental factors contribute to the increased incidence of vaginal discharge at this age. Therefore, it is important to understand the respondents' background and daily habits to tailor interventions appropriately. (Husna et al., 2023).

This age group was also selected strategically because adolescents are at a critical stage for receiving preventive education. The use of natural interventions, such as the herbal mixture KUSIR (turmeric and betel leaf), is considered suitable and acceptable for adolescents due to its non-invasive nature, natural composition, and low risk of side effects. Therefore, respondent characteristics aligned with the study's objectives are expected to provide a more accurate representation of the intervention's effectiveness in reducing the severity of fluorosis in adolescent girls.

Although the demographic characteristics of respondents were relatively balanced between the intervention and control groups, this alignment cannot be interpreted as clinical or behavioral equivalence that completely controls for confounding factors that influence fluor albus symptoms. Fluor albus conditions are influenced by various biological and psychosocial determinants, such as hormonal variations related to the menstrual cycle, history of infection, exposure to antibiotics or antiseptic products, stress levels, mucosal conditions, as well as behavioral factors and individual perceptions of reproductive health. These factors were not directly measured in this study and could potentially influence questionnaire-based symptom reporting.

Therefore, the findings of this study should be interpreted with caution as an association between the administration of the KUSIR herbal intervention and changes in subjective symptoms of fluor albus, rather than as definitive clinical causal evidence. The observed reduction in symptoms reflects changes in respondents' subjective perceptions and experiences of their condition, which remains of practical relevance in the context of reproductive health promotion and prevention in school settings.

By confirming equivalence of baseline severity scores between groups through inferential testing and adjusting the structure of the statistical analysis to align with the primary dependent variable, this study attempted to minimize attribution bias and enhance the integrity of the interpretation of the results. However, limitations related to the lack of direct measurement of clinical and biological factors should be considered in generalizing the findings and serve as the basis for recommendations for future research.

The Effectiveness of Coachmen in Reducing The Incidence of Fluor Albus Among Adolescent Girls Was Analyzed Using The Mann-Whitney U Test

A Mann–Whitney U analysis of post-test scores revealed a significant difference between the intervention and control groups. The intervention group recorded a higher mean rating of 41.45 compared to 23.55 in the control group. The total rating scores were 1326.5 for the intervention group and 753.5 for the control group. The study showed that administering the herbal concoction "kusir" (turmeric and betel leaves) to the intervention group positively reduced the severity of fluor albus compared to the control group that did not receive the same treatment. These findings indicate that herbal interventions have a significant effect on reducing vaginal discharge complaints in adolescent girls. The researchers' interpretation of these findings is that interventions based on natural ingredients like turmeric and betel leaves can provide beneficial therapeutic effects, as both ingredients possess antimicrobial and anti-inflammatory properties.

Curcumin found in turmeric and active compounds like eugenol and tannin in betel leaves are believed to inhibit the growth of microorganisms that cause fluor albus and support the physiological recovery of the reproductive organs. These results are consistent with previous research (Ineke Permatasari & Dea Savira, 2025) that reported that a concoction of turmeric and betel leaves was effective in reducing symptoms of pathological vaginal discharge in women of reproductive age. Furthermore, other studies (Pascawati & Hidayanti, 2024) have shown similar findings, concluding that herbal remedies can serve as an alternative natural therapy for treating vaginal discharge without significant side effects. Therefore, the findings of this study strengthen the evidence that non-pharmacological interventions using traditional herbal plants have great potential to be developed as part of reproductive health promotion, especially among adolescents.

Differences in Pre-Test And Post-Test Results in The Intervention Group and Control Group Based On The Wilcoxon Analysis Test

The Wilcoxon test is used to analyze paired data that are not normally distributed, specifically in measuring changes in scores before and after intervention in the same group. In this study,

the Wilcoxon test was used to evaluate differences in fluor albus (vaginal discharge) severity scores between the two tests among all respondents (N = 64) after receiving Kusir herbal treatment (turmeric and betel leaf decoction). Based on the Wilcoxon test results, all respondents (31 people) showed a decrease in the severity of fluor albus, indicated by a positive rating, with a total rating score of 496. No respondents experienced an increase in the severity level (negative rating = 0). Meanwhile, 33 respondents showed the same results between the pre-test and post-test (tie).

The improvements observed in both test results indicate that administering Kusir, a mixture of turmeric and betel leaves, effectively reduces the severity of vaginal discharge in adolescent girls. The absence of negative ratings further supports that none of the respondents experienced a worsening of their condition after the intervention. According to researchers, this demonstrates the effectiveness of a traditional concoction of turmeric and betel leaves as an antimicrobial and anti-inflammatory agent that helps reduce the symptoms of vaginal discharge. The curcumin in turmeric and eugenol in betel leaves are thought to work synergistically to inhibit the growth of bacteria or fungi that cause vaginal discharge (Carolin et al., 2024).

This finding aligns with previous research showing that herbal preparations containing active antimicrobial compounds are effective in significantly reducing vaginal discharge symptoms. Studies by (Rinawati et al., 2024) and (Susanti et al., 2025) also supports the use of natural ingredients such as betel leaves and turmeric in treating mild to moderate vaginal discharge. Therefore, this traditional herbal intervention is worth considering as a safe, affordable, and easily accessible alternative therapy for adolescent girls in an effort to prevent and treat fluor albus.

Conclusion

This study showed that an intervention using the Kusir herbal concoction (a combination of turmeric and betel leaf) was effective in reducing the severity of vaginal discharge in adolescent girls aged 15-18 years. A Mann-Whitney U test revealed a significant difference between the intervention and control groups, with a higher mean score in the intervention group. This indicates that Kusir herbal treatment has a positive effect in reducing vaginal discharge symptoms. Furthermore, the Wilcoxon test also revealed a significant decrease in scores on both tests in the intervention group, with no respondents experiencing worsening symptoms (negative rating = 0). This further strengthens the evidence that the turmeric and betel leaf herbal intervention provides a meaningful therapeutic impact. The benefits of this herbal concoction are believed to come from the curcumin content in turmeric, as well as eugenol and tannins in betel leaves, which have antimicrobial and anti-inflammatory properties, thus inhibiting the growth of microorganisms that cause vaginal discharge. Overall, these findings support the use of natural ingredients as a safe, affordable, and accessible non-pharmacological alternative intervention for treating vaginal discharge, particularly in adolescent girls. Traditional remedies such as Kusir can play a significant role in improving reproductive health in adolescents.

References

- Abu Omar, D., Kirkman, A., Scott, C., Babicova, I., & Irons, Y. (2024). Positive psychology interventions to increase self-esteem, self-efficacy, and confidence and decrease anxiety among students with dyslexia: A narrative review. *Youth, 4*(2), 835-853. <https://doi.org/10.3390/youth4020055>
- Agyei-Baffour, P., Kudolo, A., Quansah, D. Y., & Boateng, D. (2017). Integrating herbal medicine into mainstream healthcare in Ghana: clients' acceptability, perceptions and

- disclosure of use. *BMC complementary and alternative medicine*, 17(1), 513. <https://doi.org/10.1186/s12906-017-2025-4>
- Akarapongsawad, N., Laplai, A., Sanjaibrana, A., & Netngam, R. (2024). Betel Leaf Bolus Mixed With Phenolic Compounds From Betel Leaf To Inhibit Candida Albicans. *International Journal Of Technical Vocational And Engineering Technology*, 5(1), 212-217.
- Aldriana, N., Fitria, R., & Handayani, E. Y. (2023). Mengatasi Kejadian Keputihan Pada Remaja Putri Di Sman 2 Rambah Hilir. *Al-Insyirah Midwifery: Jurnal Ilmu Kebidanan (Journal of Midwifery Sciences)*, 12(1), 15-22. <https://doi.org/10.35328/kebidanan.v12i1.2331>
- Al-Mugdadi, S. F. H., Al-Zwaini, Y. K. H., & Al Sayyid, M. M. (2022). Vaginal infection. *University of Thi-Qar Journal of Science*, 9(1), 19-25. <https://doi.org/10.32792/utq/utjsci.v9i1.867%20>
- Barnes, J. (2003). Quality, efficacy and safety of complementary medicines: fashions, facts and the future. Part I. Regulation and quality. *British journal of clinical pharmacology*, 55(3), 226-233. <https://doi.org/10.1046/j.1365-2125.2003.01810.x>
- Carolyn, B. T., Azzahroh, P., & Salzabilla, P. (2024). The Effect of A Boiled Betel Leaf and Turmeric on Vaginal Discharge in Women of Childbearing Age. *International Journal of Midwifery and Health Sciences*, 2(3), 49-58.
- Clement, Y. N., Williams, A. F., Khan, K., Bernard, T., Bhola, S., Fortuné, M., ... & Seaforth, C. E. (2005). A gap between acceptance and knowledge of herbal remedies by physicians: the need for educational intervention. *BMC complementary and alternative medicine*, 5(1), 20. <https://doi.org/10.1186/1472-6882-5-20>
- Edwards, E., Mischoulon, D., Rapaport, M., Stussman, B., & Weber, W. (2013). Building an evidence base in complementary and integrative healthcare for child and adolescent psychiatry. *Child and Adolescent Psychiatric Clinics*, 22(3), 509-529.
- GiteAnamika, C. (2025). Link Between Menstrual Hygiene And Urinary Tract Infection. *Asian Journal of Pharmaceutical Research and Development*, 13(6), 144-153. <https://doi.org/10.22270/ajprd.v13i6.1667>
- Hamida, I. (2024). Hubungan Personal Hygiene Dan Keberadaan Candida Albicans Dengan Gejala Keputihan Pada Remaja (Literatur Review). *Jurnal'Aisyiyah Medika*, 9(2).
- Hanni, U., & Yaroh, N. S. (2024). Efektivitas rebusan daun sirih (Piper betle L.) dan kunyit (Curcuma longa L.) terhadap waktu penyembuhan keputihan wanita. *Kisi Berkelanjutan: Sains Medis dan Kesehatan*, 1(4).
- Herman, P. M., Craig, B. M., & Caspi, O. (2005). Is complementary and alternative medicine (CAM) cost-effective? A systematic review. *BMC Complementary and alternative medicine*, 5(1), 11. <https://doi.org/10.1186/1472-6882-5-11>
- Hidayanti, D., & Pascawati, R. (2021). Red Betel Leaf Decoction Reduces Vaginal Discharge in Adolescent Girls. *Journal of Health Research, Bandung Health Polytechnic*, 13 (1), 246–253. <https://doi.org/10.34011/juriskesbdg.v13i1.1919>
- Husna, N., Ramie, A., & Marwansyah, M. (2023). Pengetahuan Pencegahan Keputihan Abnormal (Flour Albus) Pada Remaja Putri. *Jurnal Ilmu Kesehatan Insan Sehat*, 11(2), 44-51. <https://doi.org/10.54004/jikis.v11i2.127>
- Husni, E., Sholehah, K. N. U., & Maharrani, T. (2023, December). The Effect of Health Education Through The Application “Hi, Teens” On Young Women’s Knowledge and

Attitudes About Fluor Albus. In *6th International Conference of Health Polytechnic Surabaya (ICoHPS 2023)* (pp. 77-88). Atlantis Press. https://doi.org/10.2991/978-94-6463-324-5_9

- Jana, A. D. (2024). The Relationship Between Knowledge Level and Vaginal Hygiene Practices to Abnormal Vaginal Discharge in Adolescents. *Idea: Future Research*, 2(1), 37-46.
- Kaley-Isley, L. C., Peterson, J., Fischer, C., & Peterson, E. (2010). Yoga as a complementary therapy for children and adolescents: a guide for clinicians. *Psychiatry (Edgmont)*, 7(8), 20.
- Kemper, K. J., Vohra, S., Walls, R., Task Force on Complementary and Alternative Medicine, & Provisional Section on Complementary, Holistic, and Integrative Medicine. (2008). The use of complementary and alternative medicine in pediatrics. *Pediatrics*, 122(6), 1374-1386. <https://doi.org/10.1542/peds.2008-2173>
- Khoiroh, N. A., Putri, N. A. H., Rahmayani, I., Subratha, H. F. A., & Kurniawati, Y. (2025). The Relationship Between Personal Hygiene Behavior And The Incidence Of Fluor Albus In Adolescent Girls. *JKM (Jurnal Kebidanan Malahayati)*, 11(9), 928-934. <https://doi.org/10.33024/jkm.v11i9.22635>
- Manaf, S. A., & Novemi, N. (2024). The effectiveness of using red betel leaf (*piper ornatum*) infusion compared to binahong leaf (*anredera cordifolia*) infusion in healing external genital infections. *Science Midwifery*, 12(1), 197-204. <https://doi.org/10.35335/midwifery.v12i1.1434>
- Mashoudy, K. D., Tomlinson, A. F., Kim, S., Shivashankar, V., Yosipovitch, G., & Fletcher, M. (2025). Scratching the surface: a comprehensive guide to understanding and managing vulvovaginal itching. *American journal of clinical dermatology*, 26(3), 361. <https://doi.org/10.1007/s40257-025-00939-7>
- Nisa, F., & Yudha, E. K. (2024). The Relationship between Vulva Hygiene Behavior and the Risk of Vaginal Discharge (Fluor Albus) in 8th Grade Adolescent Girls at SMPN 1 Parongpong. *Health Dynamics*, 1(12), 448-453. <https://doi.org/10.33846/hd11203>
- Novelia, S., & Tiara Carolin, B. (2023). Health Counseling and Administration of Betel Leaves to Reduce Physiological Vaginal Discharge in Adolescent Girls. *Journal of Community Empowerment for Multidisciplinary Studies (JCEMTY)*, 1 (1), 23–28. <https://doi.org/10.53713/jcemty.v1i1.55>
- Pascawati, R., & Hidayanti, D. (2024). Efektivitas Ekstrak Daun Sirih Merah Terhadap Jumlah Koloni Bakteri Pada Remaja Perempuan Yang Mengalami Keputihan. *Media Penelitian dan Pengembangan Kesehatan*, 34(4), 918-926. <https://doi.org/10.34011/jmp2k.v34i4.2394>
- Rao, V. L., & Mahmood, T. (2020). Vaginal discharge. *Obstetrics, Gynaecology & Reproductive Medicine*, 30(1), 11-18. <https://doi.org/10.1016/j.ogrm.2019.10.004>
- Rinawati, R., Akmal, J., Juliasih, NLGR, Ning Tyas, MNW, & Kiswandono, AA (2024). Assistance in Making Antibacterial Liquid Soap Products for Students (Student) Based on Betel Leaf Extract in the PKK Group. *Journal of Community Service (ABDIKEMAS)*, 6 (2), 48–54. <https://doi.org/10.36086/j.abdikemas.v6i2.2512>
- Risviana, R. A., & Anggraeni, F. D. (2024). Pengaruh Air Rebusan Daun Sirih terhadap Keputihan Fisiologis pada Wanita Usia Subur di Desa Baturono Kecamatan Salam Kabupaten Magelang. *Jurnal Kebidanan Harapan Ibu Pekalongan*, 11(1), 44-54. <https://doi.org/10.37402/jurbidhip.vol11.iss1.246>

- Saadah, N., Putri, F. S., Sumaningsih, R., & Khasanah, U. (2024). The Relationship Between Personal Hygiene Behavior and the Incidence of Vaginal Discharge. *International Journal of Advanced Health Science and Technology*, 4(3), 197-201. <https://doi.org/10.35882/ijahst.v4i3.358>
- Safitri, R., Alfitri, R., & Keswara, N. W. (2025). Synbiotic Characteristics of Soy Milk Curd for the Prevention of Pathological Fluor Albus in Female Adolescents. *Health Dynamics*, 2(8), 333-340. <https://doi.org/10.33846/hd20802>
- Sheeley, A. (2004). Sorting out common causes of abnormal vaginal discharge: empiric treatment of abnormal vaginal discharge is often inappropriate. Laboratory studies--including simple microscopy and pH testing--are essential first steps in diagnosing the cause of this common complaint. *JAAPA-Journal of the American Academy of Physicians Assistants*, 17(10), 15-21.
- Susanti, R., Ramadhan, F. V. A., & Hidayani, H. (2025). The Effect of Red Betel Leaves and Turmeric and Tamarind on Flour Albus in Adolescent Girls. *Jurnal Maternitas Kebidanan*, 10(2), 44-59. <https://doi.org/10.34012/jumkep.v10i2.7655>
- Suyenah, Y., & Dewi, MK (2022). The Effectiveness of Using Green Betel Leaf Decoction on Vaginal Discharge in Adolescents. *SIMFISIS Indonesian Midwifery Journal*, 1 (4), 151–156. <https://doi.org/10.53801/sjki.v1i4.41>
- Tamar, M., & Murbiah, M. (2024). Pengaruh Pemberian Rebusan Daun Sirih Terhadap Kejadian Keputihan Pada Remaja. *Jurnal Inspirasi Kesehatan*, 2(1), 51-59. <https://doi.org/10.52523/jika.v2i1.90>
- Wardle, J., Lui, C. W., & Adams, J. (2012). Complementary and alternative medicine in rural communities: current research and future directions. *The Journal of Rural Health*, 28(1), 101-112. <https://doi.org/10.1111/j.1748-0361.2010.00348.x>
- Zahara, I. W., Roesyanto, I. D., & Amelia, S. (2020). Profile of Microorganisms Causing Vaginal Discharge in Reproductive Women at Dr. Pirngadi Hospital in Medan. *Buletin Farmatera*, 5(1), 183-189. <https://doi.org/10.30596/bf.v5i1.3934.g3873>