

The Effect of Giving Boiled Red Betel Leaf Water on Leucorrhea in Adolescent Girls of Grade XII at SMA Negeri 1 Sangkulirang

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ABSTRACT

*Adolescent girls frequently experience leucorrhea, which can be normal or pathological. According to WHO (2024), trichomoniasis is a primary cause of pathological leucorrhea, with over 1 million cases of curable STIs affecting women aged 15 to 49 daily. In Asia, the incidence of leucorrhea is 76%, and in Indonesia, around 90% of women are at risk. Untreated pathological leucorrhea increases the risk of reproductive tract infections. Red betel leaf decoction (*Piper crocatum*) is known for antiseptic properties, but its effectiveness in reducing vaginal discharge needs further study. This study analyzed the effect of giving red betel leaf decoction on vaginal discharge in adolescent girls in grade XII at SMA Negeri 1 Sangkulirang. The research used a quasi-experimental design without a control group, 30 female students experiencing vaginal discharge were selected by consecutive sampling. The intervention administered 70 ml of red betel leaf decoction twice daily for seven days. Measurements before and after used questionnaires and observations. There was a significant decrease in vaginal discharge severity post-intervention. The Wilcoxon Signed Rank Test showed $p < 0.001$, indicating a significant difference before and after treatment. Mean ranks and Z-score values confirmed the decrease. Red betel leaf decoction effectively reduces vaginal discharge in female adolescents and can be a safe, natural alternative treatment to support reproductive health.*

KEYWORDS

Vaginal Discharge, Young Women, Red Bethel Leaves, Reproductive Health, Herbal Therapy.



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INTRODUCTION

Puberty is a phase in the development of an adolescent in which they begin to experience or reach reproductive maturity, which is characterized by physical and hormonal changes (Chaerani & Suherman, 2020). At the age of 17-19 years, adolescents are in the final stages of puberty, where hormonal changes and reproductive development reach their peak (Augustine, 2019). At this age, hormonal changes such as estrogen and progesterone still occur significantly, even though adolescents have reached puberty (Brown & Smith, 2020). These hormonal

fluctuations can affect reproductive health, including the occurrence of vaginal discharge which can be physiological or pathological (Brown & Smith, 2020).

Adolescent reproductive health is a health related to the reproductive system, function and process, including mental, social and cultural health (Sukmawati et al., 2022). Problems in women's reproductive health, especially adolescents, are the occurrence of vaginal discharge (Sari, 2023). Regular vaginal discharge is also called the term *Flour Albus* is fluid or mucus that comes out of the genitalia of a woman, both adolescents and women of childbearing age (Hidayanti & Pascawati, 2021). The production of vaginal mucus that is clear in color, does not have a pungent odor and is somewhat sticky are characteristics of physiological (normal) vaginal discharge. Meanwhile, if there is a change in vaginal mucus both in color, amount, smell and consistency, then the vaginal discharge is one of the characteristics of pathological (abnormal) vaginal discharge. In some sufferers, vaginal discharge is accompanied by itching that can irritate the intimate organs and be accompanied by pain when urinating (Aprianti et al., 2024).

In 2020, the WHO reported 156 million new cases *trichomoniasis* in women aged 15–49 years, which often causes yellow or green discharge, accompanied by an unpleasant odor (WHO, 2020). As many as 75% of women in the world experience vaginal discharge at least once in their lives and 45% of women in the world can experience vaginal discharge more than once in their lives (Alfiany & Sulistyorini, 2023). Overall, the WHO estimates that every day more than 1 million cases of treatable sexually transmitted infections, such as BV and *trichomoniasis*, occurs among women aged 15–49 years worldwide, which is the leading cause of abnormal vaginal discharge (WHO, 2024).

The incidence of vaginal discharge that occurs in the Asian continent reaches 76%. In Indonesia itself, around 90% of women have a chance to experience vaginal discharge. Unmarried adolescent girls or women in the age range of 15-24 years experience symptoms of vaginal discharge around 31.8%. In this case, it shows that young women are at high risk of vaginal discharge (Hidayanti & Pascawati, 2021).

In a study conducted by Alfiany and Sulistyorini in 2023, on the island of Kalimantan, especially in remote areas (inland), it was recorded that only 40% of young women knew and understood the causes of vaginal discharge and how to prevent it. From the results of the study on 140 students in East Kalimantan, it was found that as many as 20 people (14.3%) experienced vaginal discharge (Alfiany & Sulistyorini, 2023).

The number of sexually transmitted infections (STIs) in East Kutai Regency has increased significantly. Head of the East Kutai Health Office, dr. Bahrani said that from the data of the STI control program, there were 448 cases of STIs in East Kutai Regency from 2016-2019, while cervical cancer cases were 37 people. The data was obtained through early detection and iva tests carried out by health workers

in collaboration with the PKK and the Indonesian Midwives Association (IBI) East Kutai (EksposKaltim.Com, 2019).

Pathological (abnormal) vaginal discharge that is not treated and allowed to linger will have a bad impact on the health of the female reproductive organs. Vaginal discharge is one of the early symptoms of cervical cancer that can result in death (Batubara & Rahmayani, 2022). There are many factors that cause vaginal discharge to occur repeatedly. Some of the factors that affect vaginal discharge are hormonal factors, physical and mental fatigue and the presence of foreign bodies in the reproductive organs. There are several other factors, namely economic status, use of antiseptics, daily water use, use of sanitary napkins/pantyliners and personal hygiene (Batubara & Rahmayani, 2022).

Treatment of vaginal discharge can be done pharmacologically or non-pharmacologically. Pharmacological treatment is a treatment that uses chemical drugs that have side effects. Meanwhile, non-pharmacological treatment is a treatment without the use of chemicals but using natural ingredients that have no side effects (Novemi et al., 2023). Traditional medicinal plants that are often used as cleaners are red betel leaf plants. Because, in red betel leaves there is a content of alkaloids, flavonoids, tannins and essential oils. This content can treat vaginal discharge by killing fungi *Candida Albicans* (Rokhana & Nadia, 2024).

In a study conducted by Aprianti et al. (2024), on "The Effectiveness of Red Betel Stew and Green Betel Stew in Management *Flour Albus* to Young Women at PMB Herlina". In this study, adolescents who were given a red betel leaf boiled water intervention on the 7th day lost the complaints of vaginal discharge. Meanwhile, adolescents who were given green betel leaf decoction intervention on the 7th day reduced vaginal complaints. It can be concluded that red betel leaves are more effective than green betel leaves (Aprianti et al., 2024).

Research on red betel leaf boiled water was also carried out by Sakina et al. (2023), entitled "The Effect of Red Betel Leaf Boiling Water (*Piper Crocatum*) Against the Incident *Flour Albus* Pathology in Adolescent Girls of MAN 2 Pasuruan at Al-Yasini Islamic Boarding School". Before the administration of red betel leaf boiled water, there were 17 respondents who experienced pathological (abnormal) vaginal discharge. After being given an intervention, the results were obtained that out of 17 respondents who experienced pathological (abnormal) vaginal discharge, there were 16 respondents who experienced changes, namely from pathological vaginal discharge (abnormal) to physiological vaginal discharge (normal). However, 1 other respondent did not experience any changes, namely still with pathological (abnormal) vaginal discharge. From the results of the study, it can be concluded that the administration of red betel leaf boiled water has an effect on overcoming vaginal discharge (Sakina et al., 2023).

RESEARCH METHOD

The design of this study adopts a quantitative approach with a pseudo-experiment method (quasi-experimental), which was designed to test the effect of red betel leaf decoction on vaginal discharge in adolescent girls. In this study, the experimental design used was without control design, meaning the study only involved one intervention group without a control group (Scott, 2021). In this design, the researcher administered the intervention to a group of subjects and measured the results before and after the intervention (Pretest-Posttest).

The population in this study consisted of all adolescent girls in grade XII who experienced vaginal discharge aged 17-19 years and attended SMA Negeri 1 Sangkulirang. The total number of female students aged 17-19 years is 75 students, there are 30 female students who meet the inclusion criteria in this study. Samples were selected using the consecutive sampling method. Consecutive sampling is a method in which researchers include each subject who meets the inclusion criteria, consecutively during the study, until the required number of samples is reached. The researcher took a minimum number in one group, which was as many as 30 respondents.

The inclusion criteria in this study are: adolescent girls aged 17-19 years, experiencing vaginal discharge accompanied by other symptoms. The exclusion criteria in this study are: are menstruating or pre-menstruating, have a history of diseases that can affect vaginal discharge, such as diabetes or chronic infections and are undergoing other treatments for vaginal discharge during the study period.

The research instruments used were questionnaires and SOPs. The questionnaire used by the researcher in this study is a standard questionnaire that has been used from research conducted by Reineke Praticilia Kolle (2016). The SOP used in this study is based on a research journal entitled "Red Betel Stew Reduces Albous Fluoride in Adolescent Women" conducted by Hidayanti & Pascawati (2021). Before conducting research, the management of ethical tests is carried out to ensure that this research has met the ethical standards of research involving humans as subjects.

Researchers must prepare tools and materials used in making red betel leaf boiling water. This aims to prepare all materials that can be fulfilled to all respondents during the intervention. The tools and materials are pottery or clay pots used for boiling, 3-5 pieces of fresh red betel leaves, 300 ml of clean water, and a bottle where the red betel leaf boiled water is stored. Every day respondents are given 1 bottle containing 140 ml of red betel leaf boiled water. The use of boiled water is used 2 times a day (70 ml in the morning and 70 ml in the afternoon) without using a mixture of water and not rinsing after using the boiled water for 7 consecutive days.

In this study, univariate analysis included the incidence of vaginal discharge before and after the intervention. This analysis was to determine the difference in the number of vaginal discharge events before and after the intervention using red

betel leaf decoction. In this analysis, the normality test was performed using the Shapiro-Wilk test. The selection of this method was based on being more sensitive and accurate for small samples ($n < 50$). In this study, the number of respondents was 30 people, so Shapiro-Wilk was more appropriate than other normality tests such as Kolmogorov-Smirnov. The results of the Shapiro-Wilk Normality Test in this study are known that the score before the intervention (Pretest) has a significance value (Sig.) of 0.111 ($p > 0.05$), so it can be concluded that the data is normally distributed. Meanwhile, the posttest score had a significance value of 0.000 ($p < 0.05$), so it can be concluded that the data was not normally distributed. Thus, since any of the data is not normally distributed, the statistical analysis used to test for differences before and after the intervention should use a non-parametric method, i.e. the Wilcoxon Signed Rank Test, as an alternative to the Paired t-Test.

RESULTS AND DISCUSSION

Respondent Characteristics

Respondent characteristics are a general description of the respondent's profile or identity. In this study, respondent characteristics were used to determine the frequency distribution of the respondents' age.

Table 1. Characteristics of Respondents

No.	Age	Frequency	Mean	SD	Median	At least	Maximum
1.	17 years	18					
2.	18 years old	11	17,43	0,57	17	17	19
3.	19 years old	1					
TOTAL		30					

(source: Data from the study, 2025)

The majority of respondents were 17 years old (60%), followed by 18 years old (36.67%) and only a few were 19 years old (3.33%). The average age of the respondents was 17.43 years with a small variation ($SD = 0.57$) and a median of 17 years. This shows that the age distribution is concentrated in the range of 17–18 years.

Univariate Analysis Results

Univariate analysis is a data analysis technique that involves only one variable. The main objective of this analysis is to understand the characteristics of each variable in the research data. In this study, univariate analysis included the incidence of vaginal discharge before and after the intervention. The following are the results of the univariate analysis in this study:

Table 2. Occurrence of vaginal discharge before intervention

No.	Score	Frequency	Percentage
1.	2	4	13.3
2.	3	5	16.7
3.	4	4	13.3

4.	5	9	30.0
5.	6	4	13.3
6.	7	3	10.0
7.	8	1	3.3
Total		30	100.0

(Source: Primary data from the study, 2025)

From the data obtained, it can be seen that the majority of respondents experience vaginal discharge with a total of varying events. Frequency with a score of 5 was the most common, with 9 respondents (30%) reporting experiencing 5 events of vaginal discharge and only 1 respondent (3.3%) reporting a frequency with a score of 8.

Table 3. Incidence of vaginal discharge after intervention

No.	Score	Frequency	Percentage
1.	0	14	46.7
2.	1	4	13.3
3.	2	8	26.7
4.	3	3	10.0
5.	4	1	3.3
Total		30	100.0

(Source: Primary data from the study, 2025)

From the data obtained, it can be seen that after treatment, the majority of respondents experienced a significant decrease in the incidence of vaginal discharge. A total of 14 respondents (46.7%) reported a frequency with a score of 0 and only 1 respondent (3.3%) reported a frequency with a score of 4.

Table 4. Incidence of Vaginal Discharge Before and After Intervention

No.	Variable	Frequency	Mean	SD	Median	Min	Max
1.	Before Intervention	30	4,57	1,654	5	2	8
2.	After Intervention	30	1.10	1,213	0	0	4

(Source: Primary data from the study, 2025)

Based on Table 4, there was a decrease in the incidence of vaginal discharge after intervention with red betel leaf boiled water, which can be seen from the decrease in the mean from 4.57 to 1.10 and the median from 5 to 1. In addition, the previous minimum value of 2 became 0, and the maximum value that was initially 8 decreased to 4, suggesting that the severity of vaginal discharge was significantly reduced after the intervention. This indicates that the administration of red betel leaf decoction is effective in reducing the incidence of vaginal discharge in adolescent girls.

Table 5. Data Normality Test

No.	Variable	<i>Saphiro Wilk</i>			Conclusion
		Statistics	Df	Sig.	
1.	Before Intervention	0.943	30	0.111	Usual
2.	After the Intervention	0.815	30	0.000	Abnormal

(Source: Primary data from the study, 2025)

Based on the results of the Shapiro-Wilk Normality Test in Table 5, it is known that the score before the intervention (Pretest) has a significance value (Sig.) of 0.111 ($p > 0.05$), so it can be concluded that the data is normally distributed. Meanwhile, the posttest score had a significance value of 0.000 ($p < 0.05$), so it can be concluded that the data was not normally distributed. Thus, since any of the data is not normally distributed, the statistical analysis used to test for differences before and after the intervention should use a non-parametric method, i.e. *the Wilcoxon Signed Rank Test*, as an alternative to *the Paired t-Test*.

Bivariate Analysis Results

Bivariate analysis is a statistical analysis method used to look at the relationship between two variables. In this study, bivariate analysis aimed to find out whether there was a relationship before and after the intervention of red betel leaf boiling water. The following are the results of the test results of the effect of red betel leaf decoction on vaginal discharge in adolescent girls in grade XII before and after the intervention:

Table 6. Test of the Effect of Red Betel Leaf Boiled Water on Vaginal Discharge in Grade XII Adolescent Girls Before and After Intervention

No.	Variable	Z-Score	Red Ranks	SD	Median	Min	Max	P-Value
1.	Before Intervention	4.804	4.57	1.654	5.00	2	8	<
2.	After the Intervention	3.575	1.10	1.213	1.00	0	4	0.001

(Source: Primary data from the study, 2025)

Based on Table 6, there was a decrease in Mean Ranks from 4.57 before the intervention to 1.10 after the intervention, as well as a decrease in the median from 5.00 to 1.00, which indicates a reduction in the level of vaginal discharge after the administration of red betel leaf boiling water. The Z-score decreased from 4,804 to 3,575, indicating a significant change in the distribution of data. In addition, the p-value < 0.001 showed that the difference before and after the intervention was statistically significant, so it can be concluded that red betel leaf decoction is effective in reducing the incidence of vaginal discharge in adolescent girls.

Discussion

The incidence of vaginal discharge before being given red betel leaf boiled water to a class XII adolescent girl at SMA Negeri 1 Sangkulirang

Based on the results of the study in Table 1, the distribution of vaginal discharge events before the intervention showed that the vaginal discharge score varied between 2 to 8. Score 5 had the highest frequency (30%), followed by score 3 (16.7%), and scores 2, 4, and 6 were 13.3%, respectively. Meanwhile, the highest score of 8 only occurred in 3.3% of respondents, which shows that most respondents experienced vaginal discharge with symptoms ranging from vaginal discharge accompanied by itching, often discharge a lot of thick fluid and was milky to

grayish in color, smelled bad and fishy, and some experienced symptoms of a foamy liquid resembling soapy water.

In this study, there was one respondent who gave inconsistent answers when filling out a questionnaire before the intervention, where he stated that his vaginal discharge was clear but also reported that his vaginal discharge was milky thick. This inconsistency can be caused by several factors, such as the respondent's lack of understanding of the question, difficulty in accurately identifying the characteristics of vaginal discharge, or changes in vaginal conditions in a close period of time. In addition, subjectivity factors in respondents' perception of the color and consistency of vaginal discharge can also play a role. This shows the importance of providing clearer instructions to respondents as well as considering additional methods, such as direct observation or daily logging, to improve the accuracy of the data collected.

Based on the results of the study in Table 3, before the intervention was given, the average vaginal discharge score of the respondents was 4.57 with a standard deviation of 1.654. A median of 5.00 showed that most respondents experienced vaginal discharge with various symptoms before being given red betel leaf boiled water. The minimum score is 2, while the maximum score reaches 8, indicating the presence of variations in vaginal discharge symptoms among respondents.

In Table 4.6, the results of the statistical test showed a Z-score of 4,804 with a p-value < 0.001 , which indicates that the incidence of vaginal discharge before the intervention was quite significant. This data illustrates that almost all respondents experienced vaginal discharge with varying symptoms before the intervention was taken, according to the results of a preliminary study which found that 90% of respondents experienced vaginal discharge with some symptoms.

Based on Table 1 (Respondent Characteristics), the majority of respondents were 17 years old (18 respondents, 60%), followed by 18 years old (11 respondents, 36.7%), and only 1 respondent (3.3%) was 19 years old. The results of this study are in line with research by Novemi et al. (2023) that the majority of respondents were 17 years old. However, there is a difference based on the number of respondents where the age of 17 years (11 respondents, 37%), followed by the age of 18 years (10 respondents, 33%) and the age of 16 years (9 respondents, 30%).

The results showed that the majority of respondents were in the age range of 17-19 years, which is the final phase of adolescence where hormonal changes are still quite active. The results of the study also showed that the incidence of vaginal discharge occurred more at the age of 17 compared to the ages of 18 and 19 years. Respondents with scores of 2 to 7 were more likely to be found at the ages of 17 and 18, while the highest score of 8 occurred in only one 19-year-old respondent. This suggests that the severity of vaginal discharge varies more in younger age groups, likely due to personal hygiene factors that still need to be improved.

A study by Brown & Smith (2020) states that adolescents in this age range have more fluctuating estrogen levels than more adult ages, which can lead to increased

cervical mucus production. In addition, research by Hidayanti & Pascawati (2021) found that adolescent girls aged 15-19 years have a higher prevalence of pathological vaginal discharge than other age groups. Hormonal changes that occur at this age combined with suboptimal reproductive organ hygiene can increase the risk of pathological vaginal discharge.

Physiological and pathological vaginal discharge is influenced by hormonal, environmental, and reproductive organ hygiene factors (Batubara & Rahmayani, 2022). These factors are in line with the findings of this study, where before the intervention most respondents experienced significant vaginal discharge. Pathological vaginal discharge is often associated with overgrowth of microorganisms such as *Candida albicans* and *Trichomonas vaginalis*, which can develop due to an excessively humid vaginal environment or sub-optimal hygiene (Novemi et al., 2023).

This study has results that are in line with the research of Sakina et al. (2023), which found that 85% of respondents experienced vaginal discharge before the intervention. The study Novemi et al. (2023) noted that the average score of vaginal discharge before the intervention was 5.80, which was higher compared to this study (4.57). This difference may be due to individual hygiene factors, diet, and the environment in which the respondents lived.

The incident of vaginal discharge after being given boiled water with red betel leaves to a class XII adolescent girl at SMA Negeri 1 Sangkulirang

After the intervention using red betel leaf boiled water for 7 days, the results of the study showed a significant reduction in the incidence of vaginal discharge. Table 2 shows that 46.7% of respondents experienced a score of 0 (no longer experiencing vaginal discharge), while 26.7% experienced a score of 2, and only 3.3% of respondents still had a score of 4. This distribution showed that after the intervention, most respondents experienced improvement in vaginal discharge with fewer symptoms.

However, there were 9 respondents who experienced a minimal decrease in score, with a decrease of only 1-3 points after the intervention. The majority of these respondents came from the 17 and 18 age groups, with several possible factors influencing the intervention response, such as less than optimal personal hygiene, more active hormonal factors, or the presence of certain lifestyle habits that increase the risk of vaginal discharge. The study of Sakina et al. (2023) also reported that some respondents in their study did not experience maximum improvement after intervention with herbal ingredients, which is thought to be due to these factors.

The results showed that some respondents still experienced complaints of itching and milk-thick discharge even though they had been given an intervention using red betel leaf boiled water. This can be caused by other factors that are not controlled in the study, such as personal hygiene, underwear habits that do not absorb sweat, or the presence of bacterial or fungal infections that require additional

therapy. In addition, there were respondents who before the intervention had clear or concentrated milk vaginal discharge, but after the intervention their vaginal discharge remained milky thick. These changes can be attributed to the body's adaptation process to the intervention, where the effects of red betel leaf decoction have not shown optimal results in a relatively short study period. In addition, hormonal factors and individual health conditions can also play a role in changes in vaginal discharge characteristics, so responses to interventions may vary from one respondent to another. These findings indicate that although red betel leaf decoction can provide benefits, its effectiveness can be affected by a variety of other factors, so further research with stricter control is needed to ascertain its impact on various vaginal conditions.

From Table 5, the Wilcoxon Signed Rank Test statistical test showed a Z-score of 3.575 with a p-value of < 0.001 , which confirms that the difference before and after the intervention was statistically significant.

The Hidayanti & Pascawati study (2021) showed that intervention with red betel leaves can reduce the number of bacteria that cause vaginal discharge by 0.87 colonies/m², which supports the effectiveness of this method. In addition, the study of Novemi et al. (2023) found that the average vaginal discharge score after intervention was 3.93, which is higher than this study (1.10), suggesting that the methods in this study may be more effective.

A study by Anggraini et al. (2022) found that giving boiled water of red betel leaves for 7 days reduced the level of vaginal discharge in 85% of respondents, with higher effectiveness than other methods such as the use of chemical antiseptics. This corroborates the results of this study that herbal based interventions are safer and still effective in reducing vaginal discharge.

This study confirms that red betel leaf decoction is effective in reducing the incidence of vaginal discharge, with results that are in line with previous theories and research. However, there were some respondents who experienced minimal score declines, which may be due to other factors such as personal hygiene patterns, individual hormonal conditions, or environmental factors that are not optimal in supporting the effectiveness of the intervention.

The effect of giving red betel leaf boiled water on vaginal discharge in adolescent girls at SMA Negeri 1 Sangkulirang

The results of this study show that the administration of red betel leaf decoction has a significant influence on reducing the incidence of vaginal discharge in adolescent girls. Based on Table 5, the results of the statistical test showed that the Z-score before the intervention was 4.804, while the Z-score after the intervention decreased to 3.575, with a p-value < 0.001 . This shows that there is a significant reduction in the incidence of vaginal discharge after the intervention. In addition, the mean ranks of vaginal discharge before the intervention were 4.57, and after the intervention decreased to 1.10, indicating that the average severity of vaginal

discharge symptoms decreased drastically after treatment with red betel leaf decoction.

This decrease can also be seen from the change in the median value, where before the intervention the median value of vaginal discharge severity was 5.00, while after the intervention it dropped to 1.00. The minimum and maximum values also changed, from the range of 2-8 before the intervention, to 0-4 after the intervention, which confirmed that most of the respondents experienced improvement in vaginal discharge.

Although intervention with red betel leaf boiling water has been given, there are still some respondents in Sangkulirang who experience symptoms of vaginal discharge with relatively high scores. This can be caused by several factors. One of them is less than optimal cleanliness and vulvar hygiene patterns, where some respondents may still use underwear that does not absorb sweat or have improper habits of cleaning the genital area. In addition, environmental factors such as high humidity in Sangkulirang can increase the risk of the growth of fungi and bacteria that cause vaginal discharge. Dietary factors also have an effect, especially the consumption of high-sugar and spicy foods that can disrupt the balance of normal flora in the vagina. Hormonal changes in the body, especially before or after menstruation, can also be a trigger that makes some respondents still experience vaginal discharge. In addition, psychological factors such as stress due to academic stress or social problems can also weaken the immune system, making the body more susceptible to infection.

It is possible that some respondents have certain bacterial or fungal infections that cannot be completely overcome with red betel leaf decoction and require further medical treatment. Therefore, interventions with red betel leaf decoction should not be used continuously without medical evaluation. If after 14 days vaginal discharge still occurs or has worsened, there may be other factors such as a more complex infection that require pharmacological therapy. Several studies suggest further evaluation before resuming the use of red betel leaf boiled water so as not to disturb the balance of microbial ecosystems in the genital area (Fitriani et al., 2021; Rokhana & Nadia, 2024). Compliance in following the intervention is also an important factor, where if respondents do not use boiled water according to the procedure, its effectiveness will be reduced. Therefore, although the interventions provided have shown good results in most respondents, a more holistic approach is still needed through hygiene education, healthy eating, stress management, and further evaluation to ensure the overall effectiveness of the intervention.

In theory, red betel leaves contain flavonoids, saponins, and tannins that have antibacterial and antifungal properties (Rokhana & Nadia, 2024). This content is effective in inhibiting the growth of bacteria and fungi that cause vaginal discharge, such as *Candida albicans* and *Gardnerella vaginalis* (Sakina et al., 2023). This supports the results of research that shows the effectiveness of red betel leaves in reducing the incidence of vaginal discharge.

The results of this study are also consistent with previous research. Research by Hidayanti & Pascawati (2021) found that intervention with red betel leaves can reduce the number of bacteria that cause vaginal discharge by 0.87 colonies/m², which supports the effectiveness of this method. The study of Novemi et al. (2023) found that the average vaginal discharge score after intervention was 3.93, which is higher than this study (1.10), suggesting that the methods in this study may be more effective.

In addition, research by Anggraini et al. (2022) found that giving boiled water of red betel leaves for 7 days reduced the rate of vaginal discharge in 85% of respondents, with higher effectiveness than other methods such as the use of chemical antiseptics. This corroborates the results of this study that herbal based interventions are safer and still effective in reducing vaginal discharge.

Several other studies have also shown similar effectiveness. A study by Maharani et al. (2020) found that the use of red betel leaves can reduce vaginal discharge symptoms by 70% within 5-7 days, which is almost the same as the results of this study where 46.7% of respondents did not experience vaginal discharge again after the intervention.

The results of this study are also more effective than the research of Fitriani et al. (2021) which used chemical antiseptics to treat vaginal discharge, where only 40% of respondents experienced a significant decrease in vaginal discharge scores within 7 days. This difference can be due to the natural properties of red betel leaves that are more tolerable by the body than chemical antiseptics, which in some cases can actually cause vaginal irritation.

The results of this study show that the administration of red betel leaf decoction has a significant influence on reducing the incidence of vaginal discharge in adolescent girls. These results are in line with previous theories and journals, although there are some differences that can be explained by variations in research methods, sample characteristics, and intervention methods.

Although red betel leaf boiled water has been proven to be effective in reducing vaginal discharge, its use needs to be considered so as not to overdo it. If vaginal discharge has returned to normal, it is recommended to stop use to prevent disruption of the normal balance of flora in the vagina. Some studies recommend that the maximum use is 14 days, as prolonged use can disrupt the normal pH and flora balance of the vagina (Anggraini et al., 2022; Maharani et al., 2020). If after 14 days the vaginal discharge does not improve or worsens, then further evaluation and possible medical intervention are needed to avoid more serious infections (Novemi et al., 2023; Hidayanti & Pascawati, 2021).

Thus, this study confirms that the administration of red betel leaf boiled water is an effective and safe alternative method in reducing the incidence of vaginal discharge in adolescent girls, but still requires further supervision and evaluation for long-term use.

CONCLUSION

Before receiving red betel leaf boiled water, adolescent girls in grade XII at SMA Negeri 1 Sangkulirang exhibited relatively high levels of vaginal discharge, with an average score of 4.57, indicating varied and noticeable symptoms. After the intervention, the average score significantly decreased to 1.10, demonstrating a marked improvement and reduction in vaginal discharge symptoms. Statistical analysis using the Wilcoxon Rank Test confirmed the effectiveness of red betel leaf decoction, showing a significant difference ($p < 0.001$) before and after treatment. These results suggest that red betel leaf boiled water is an effective, safe, and natural alternative for managing vaginal discharge in adolescent girls. Future research could explore the long-term effects of this treatment, compare it with other conventional therapies, and investigate its mechanism of action to better understand and optimize its therapeutic potential.

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