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# Effect of Green Betel Leaf (Piper Betle) Decoction on Pathological Vaginal Discharge in Female Students of Cendrawasih Polytechnic Palu

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***Abstract***
***Introduction:*** *Pathological leucorrhea that is not properly treated can cause vaginitis, spread to the urinary tract, and lead to urinary tract infections with serious complications.* ***Objective:*** *To examine the effect of green betel leaf (Piper betle leaf) decoction on reducing the intensity of pathological leucorrhea among female students at Politeknik Cendrawasih Palu.* ***Methods:*** *This quantitative study applied a quasi-experimental design with a control group and pre-test post-test approach, involving 60 participants at Politeknik Cendrawasih Palu.* ***Results and Discussion:*** *Pre-test results showed that 61.7% of respondents were in the mild category and 18.3% in the severe category. Post-test findings indicated an increase in the normal category in the intervention group (30.0%). Wilcoxon Signed Ranks test revealed no significant change in the control group (p-value 0.1 > 0.05), while a significant effect was observed in the intervention group (p-value < 0.001), confirming the effectiveness of green betel leaf decoction.* ***Conclusion:*** *Green betel leaf decoction effectively reduces the intensity of pathological leucorrhea among female students.*

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## Introduction

According to the World Health Organization (WHO), adolescence (10–19 years) is a critical period for establishing reproductive health behaviors, during which rapid physical and psychosocial changes increase vulnerability to reproductive health problems among young women (WHO, 2024a). Reproductive health is defined as complete physical, mental, and social well-being related to the reproductive system and its functions (WHO, 2024a;Permenkes, 2025).

Pathological vaginal discharge is a common reproductive health problem among adolescents and young women, including female university students. Globally, bacterial vaginosis affects 23–29% of women of reproductive age, while infections such as Trichomonas vaginalis and Chlamydia trachomatis frequently present with abnormal vaginal discharge (WHO, 2024b;WHO, 2024c;WHO, 2024e). Adolescents and young adults are particularly vulnerable due to limited reproductive health knowledge and suboptimal hygiene practices (Helmi et al., 2023;WHO, 2024c).

In Indonesia, awareness of pathological vaginal discharge remains low. Only 21.4% of women aged 15–19 years and 34.6% of those aged 20–24 years recognize this condition, indicating substantial knowledge gaps (BKKBN, 2017; BPS, 2024). In Central Sulawesi Province, although reproductive health education has reached 8,648 adolescents aged 15–24 years, pathological vaginal discharge remains prevalent (BPS, 2024).

Pathological vaginal discharge is characterized by abnormal color, odor, and consistency, often accompanied by itching or pain, and is commonly caused by fungal, bacterial, or parasitic infections (Helmi et al., 2023; WHO, 2024b). If untreated, it may result in pelvic inflammatory disease, infertility, ectopic pregnancy, and increased risk of cervical cancer (WHO, 2024b;WHO, 2024c;WHO, 2024e;Buanayuda & Kusumawardani, 2018).

The intensity of pathological vaginal discharge can be classified as mild, moderate, or severe, based on volume, odor, color changes, and symptom severity (Helmi et al., 2023; Eriyani, 2023). Management includes medical therapy and complementary approaches such as green betel leaf (Piper betle L.) decoction, which has demonstrated antimicrobial effects in reducing pathological vaginal discharge (Eriyani, 2023;Wahyuni dkk., 2024).

A preliminary study in Palu City showed that 70% of female students at Cendrawasih Polytechnic experienced pathological vaginal discharge, a higher proportion than at Widya Nusantara University (40%) and Muhammadiyah University of Palu (30%). Therefore, this study aims to examine the effect of green betel leaf (Piper betle L.) decoction on reducing the intensity of pathological vaginal discharge among female students at Cendrawasih Polytechnic of Palu.

## Method

This research is quantitative using a quasi-experimental design with a control group pre-test and post-test. This study was conducted at the Cendrawasih Polytechnic of Palu campus during the period from August 19 to September 19, 2025. The study population consisted of all active female students at Cendrawasih Polytechnic of Palu, totaling 183 individuals. From this population, a sample of 60 female students was selected. The sampling technique used was accidental sampling, in which respondents were selected based on chance encounters and their fulfillment of the study criteria. In this study, the

sampling criteria were determined based on the results of the pre-test to identify female students experiencing vaginal discharge.

Data analysis was performed using a paired sample t-test when the data were normally distributed. If the data did not meet the normality assumption, the analysis was continued using the Wilcoxon test to examine the relationship between the independent and dependent variables.

## Result and Discussion

### 1. Result

### Univariate Analysis

#### 1) Frequency Distribution Based on Type of Vaginal Discharge

Table 1 presents the frequency distribution of the types of vaginal discharge among respondents based on the questionnaire results collected prior to the intervention. The classification of vaginal discharge types aims to describe the respondents' baseline condition, specifically whether they experienced physiological or pathological vaginal discharge. This initial identification is important to determine the proportion of respondents with abnormal vaginal discharge complaints, which can serve as a basis for assessing the effectiveness of the intervention in the subsequent stage.

**Table 1**
Frequency distribution based on type of vaginal discharge

| Types of Vaginal Discharge | f | % |
|---|---|---|
| Vaginal Discharge Physiology | 123 | 67.2% |
| Pathological Vaginal Discharge | 60 | 32.8% |
| **Total** | **183** | **100** |

*Source: Primary Data, 2025*

Based on Table 1, the results of the questionnaire on the signs and symptoms of vaginal discharge experienced by female students of Cendrawasih Polytechnic of Palu showed that 123 respondents (67.2%) were categorized as having physiological vaginal discharge, while 60 respondents (32.8%) experienced pathological vaginal discharge.

#### 2) Frequency Distribution Based on the Level of Vaginal Discharge at Pre-Test

Table 2 presents the frequency distribution of the level of pathological vaginal discharge at the pre-test stage in both research groups, namely the control group and the intervention group. This presentation aims to describe the baseline condition of respondents before the administration of the green betel leaf decoction intervention. By identifying the distribution of vaginal discharge levels at the pre-test stage, the researchers can ensure that the initial conditions of both groups are relatively comparable and can serve as a basis for assessing changes after the intervention is implemented. The complete distribution of vaginal discharge levels in each group is presented in the following table.

**Table 2**
Frequency distribution based on the level of vaginal discharge Pre Test

| Level of Vaginal Discharge | Control | | Intervention | | Total | |
|---|---|---|---|---|---|---|
| | f | % | f | % | f | % |
| Severe | 2 | 3.3 | 9 | 15.0 | **11** | **18.3** |
| Moderate | 5 | 8.3 | 7 | 11.7 | **12** | **20.0** |
| Mild | 23 | 38.3 | 14 | 23.3 | **37** | **61.7** |
| Normal | 0 | 0,0 | 0 | 0,0 | **0** | **0.0** |
| **Total** | **30** | **50** | **30** | **50** | **60** | **100** |

*Source: Primary Data, 2025*

Based on Table 2, the results of the questionnaire on the signs and symptoms of vaginal discharge experienced by female students of Cendrawasih Polytechnic of Palu showed that 37 respondents (61.7%) were categorized as having mild pathological vaginal discharge, 12 respondents (20.0%) as having moderate pathological vaginal discharge, and 11 respondents (18.3%) as having severe pathological vaginal discharge.

**3) Frequency Distribution Based on Post-Test Leucorrhea Level**

Table 3 presents the frequency distribution of the levels of pathological vaginal discharge at the post-test stage between the control group and the intervention group. The data illustrate changes in the respondents' vaginal discharge condition after the intervention, as well as differences in outcomes between participants who did not receive the intervention and those who received the green betel leaf decoction treatment. Through this table, the distribution of each severity category of vaginal discharge, ranging from severe to normal, can be observed in both groups, thereby providing a clearer overview of the effectiveness of the intervention in reducing the intensity of pathological vaginal discharge among female students of Cendrawasih Polytechnic of Palu.

**Table 3**
Frequency distribution based on the level of vaginal discharge Pre Test

| Pathological Vaginal Discharge | Control | | Intervention | | Total | |
|---|---|---|---|---|---|---|
| | f | % | f | % | f | % |
| Severe | 2 | 3.3 | 0 | 0,0 | **2** | **3.3** |
| Moderate | 5 | 8.3 | 4 | 6.7 | **9** | **15.0** |
| Mild | 21 | 35.0 | 8 | 13.3 | **29** | **48.3** |
| Normal | 2 | 3.3 | 18 | 30.0 | **20** | **33.3** |
| **Total** | **30** | **50** | **30** | **50** | **60** | **100** |

*Source: Primary Data, 2025*

Based on Table 3, the results of the questionnaire on the signs and symptoms of vaginal discharge experienced by female students of Cendrawasih Polytechnic of Palu showed that 20 respondents (33.3%) were categorized as having physiological vaginal discharge, 29 respondents (48.3%) as having mild pathological vaginal discharge, 9 respondents (15.0%) as having moderate pathological vaginal discharge, and 2 respondents (3.3%) as having severe pathological vaginal discharge

**Bivariate Analysis**

**The Effect of Boiled Green Betel Leaves (Piper Betle Leaf) on Reducing the Intensity of Pathological Vaginal Discharge**

The statistical analysis was conducted using the Wilcoxon Signed Ranks test. The results of the analysis before (pre-test) and after (post-test) in the control group, which received a placebo, and in the intervention group, which received green betel leaf (Piper betle L.) decoction, are presented in Tables 4 and 5. These tables show the distribution of positive ranks, negative ranks, and ties (no change), as well as the significance values obtained to test the effect of green betel leaf (Piper betle L.) decoction on reducing the intensity of pathological vaginal discharge.

**Control Group**

Table 4 presents the results of the data analysis regarding changes in vaginal discharge scores in the control group between the pre-test and post-test. This analysis aimed to determine whether there were differences in vaginal discharge scores among respondents who did not receive the green betel leaf decoction intervention. The data are presented in the form of negative ranks, positive ranks, and ties, which represent decreases, increases, or no changes in vaginal discharge scores, respectively. The complete distribution of score changes in the control group is shown in Table 4:

**Tabel 4**

Results of Data Analysis of the Influence of the Control Group

| | | **n** | **%** | **Sig.** |
|---|---|---|---|---|
| Post-test Control Vaginal Discharge Score - Pretest Control Vaginal Discharge Score | Negative Ranks | 0 | 0.0 | 0.1 |
| | Positive Ranks | 2 | 6.7 | |
| | Ties | 28 | 93.3 | |
| | Total | **30** | **100** | |

*Source: Primary Data, 2025*

Based on the results of the data analysis in Table 4, the positive ranks representing respondents who experienced a decrease in the level of vaginal discharge in the control group accounted for 2 respondents (6.7%). The ties category, indicating respondents who experienced neither an increase nor a decrease, included 28 respondents (93.3%). The negative ranks, representing respondents who experienced an increase in vaginal discharge, included 0 respondents (0.0%). The analysis also showed a p-value of 0.1 (>0.05), indicating that there was no statistically significant effect in the control group.

**Intervention Group**

Table 5, presents the results of data analysis regarding the effect of administering green betel leaf decoction in the intervention group by comparing vaginal discharge scores at the pre-test and post-test stages. This analysis aimed to observe the changes that occurred after the intervention was administered, whether there was a decrease, an increase, or no change in the level of pathological vaginal discharge. The distribution of negative ranks, positive ranks, and ties illustrates the direction of changes in respondents' scores following the intervention. The complete results of the analysis are presented in Table 5.

**Tabel 5**
Results of Data Analysis of the Influence of the Control Group

| | | n | % | Sig. |
|---|---|---|---|---|
| Post-test Control Vaginal Discharge Score - Pretest Control Vaginal Discharge Score | Negative Ranks | 0 | 0,0 | 0,001 |
| | Positive Ranks | 30 | 100 | |
| | Ties | 0 | 0,0 | |
| | Total | **30** | **100** | |

*Source: Primary Data, 2025*

Based on the results of the data analysis in Table 5, the positive ranks representing respondents who experienced a decrease in the level of pathological vaginal discharge after receiving green betel leaf decoction included 30 respondents (100%). The ties category, indicating respondents who experienced no increase or decrease in the level of vaginal discharge, included 0 respondents (0.0%). The negative ranks, representing respondents who experienced an increase in pathological vaginal discharge after receiving green betel leaf decoction, also included 0 respondents (0.0%). The analysis further showed a p-value of < 0.001, indicating a significant effect of green betel leaf (Piper betle L.) decoction on reducing the intensity of pathological vaginal discharge among female students at Cendrawasih Polytechnic of Palu.

**Differences in the Intensity of Pathological Vaginal Discharge in the Treatment Group and the Control Group**

Table 6, presents the results of the difference analysis using the Mann–Whitney test to determine the effect of green betel leaf decoction on reducing the intensity of pathological vaginal discharge between the control group and the intervention group. This analysis was conducted because the data were non-parametrically distributed, thus requiring an alternative test to compare two independent groups.

**Tabel 6**
Results of Differential Test Analysis

| Group | N | Mean Rank | Sum of Ranks | P-Value |
|---|---|---|---|---|
| Control | 30 | 16.20 | 486.00 | |
| Intervention | 30 | 44.80 | 1344.00 | <0.001 |
| **Total** | **60** | | | |

*Source: Primary Data, 2025*

Based on Table 6, the results of the Mann–Whitney U test on changes in vaginal discharge intensity scores showed that the mean rank of the intervention group was 44.80, which was substantially higher than that of the control group (16.20). The sum of ranks in the intervention group was also significantly greater (1344.00) compared to the control group (486.00). The statistical test indicated a highly significant difference between the two groups ($p < 0.001$). These findings demonstrate that the administration of green betel leaf decoction was significantly more effective in reducing the intensity of pathological vaginal discharge compared to the control group.

## 2. Discussion

### The Effect of Green Betel Leaf Decoction (Piper Betle Leaf) on Reducing the Intensity of Pathological Vaginal Discharge in the Control Group

Most respondents in the control group showed no change in the intensity of pathological vaginal discharge between the pre-test and post-test periods, as indicated by a high proportion of ties (93.3%). Only two respondents (6.7%) experienced a decrease, and none showed worsening symptoms. The statistical analysis ($p = 0.1$) confirmed that there was no significant reduction in vaginal discharge intensity in the absence of intervention.

These findings support previous evidence that pathological vaginal discharge generally does not resolve spontaneously, as it is commonly associated with infections caused by microorganisms such as Candida albicans and Trichomonas vaginalis, which require specific treatment to restore vaginal flora balance and pH (Septiawati, 2021). Similarly, Buanayuda and Kusumawardani (2020) reported that untreated pathological vaginal discharge tends to persist or worsen over time due to contributing factors such as poor genital hygiene, hormonal changes, tight clothing, and psychosocial stress among adolescents and young adults.

The stability of symptoms observed in the control group indicates that physiological and microbiological disturbances underlying pathological vaginal discharge require active management. Without antimicrobial or antifungal intervention, meaningful symptom improvement is unlikely, which explains the absence of significant change during the study period.

### Effect of Green Betel Leaf Decoction (Piper betle L.) on the Reduction of Pathological Vaginal Discharge Intensity in the Intervention Group

All respondents in the intervention group experienced a significant reduction in pathological vaginal discharge intensity following the administration of green betel leaf decoction, with a highly significant statistical result ($p < 0.001$). This finding confirms the effectiveness of green betel leaf decoction as a non-pharmacological intervention.

The observed effect is consistent with studies reporting that green betel leaf contains bioactive compounds such as phenols, chavicol, flavonoids, tannins, and saponins, which exhibit antibacterial, antifungal, antiseptic, and anti-inflammatory properties (Hermanto et al., 2023). Previous studies have demonstrated similar outcomes, including reductions in discharge volume, odor, itching, and microbial growth after betel leaf decoction use (Kaparang & Admasari, 2022; Etnis & Maay, 2021).

The effectiveness observed in this study suggests that the bioactive components of green betel leaf play a direct role in suppressing pathogenic microorganisms and supporting the restoration of normal vaginal flora. Good adherence among respondents and the absence of confounding external factors further support the validity of these findings.

Regarding safety, previous literature indicates that green betel leaf decoction is generally safe when used appropriately and for short durations, as traditionally practiced, with minimal reported side effects (Sadiah et al., 2022). However, prolonged or excessive use may potentially disrupt normal vaginal flora or cause local irritation, highlighting the importance of controlled use and appropriate health education.

**Differences in the Reduction of Pathological Vaginal Discharge Intensity Between the Control Group and the Intervention Group**

A significant difference was observed between the control and intervention groups ($p < 0.001$), with the intervention group demonstrating substantially greater reductions in pathological vaginal discharge intensity. The higher mean rank in the intervention group confirms the superior effectiveness of green betel leaf decoction compared to no treatment.

These results align with previous findings showing that the antimicrobial and astringent properties of compounds such as eugenol, flavonoids, tannins, and saponins contribute to reduced vaginal secretion and irritation (Eriyani, 2023). The findings further support reproductive health theories suggesting that herbal-based therapies can serve as effective alternatives for managing mild to moderate vaginal infections, particularly among adolescents and young adults.

Overall, this study strengthens evidence that green betel leaf decoction is an effective, accessible, and low-cost complementary therapy for reducing pathological vaginal discharge. While its short-term use appears safe, further studies are recommended to evaluate long-term safety and optimal duration of use to prevent potential adverse effects on vaginal health.

**Conclusion**

This study demonstrates that the administration of green betel leaf (Piper betle L.) decoction is significantly effective in reducing the intensity of pathological vaginal discharge among female students at Cendrawasih Polytechnic of Palu. The intervention group experienced a meaningful reduction in vaginal discharge intensity, reaching the normal category, while the control group showed no significant change. The difference between the two groups was statistically significant ($p < 0.001$), indicating that green betel leaf decoction can be recommended as an effective alternative therapy for managing pathological vaginal discharge.

## Reference

BKKBN. (2017). *SDKI Kesehatan Reproduksi Remaja*. http://www.dhsprogram.com.

BPS. (2024). *Prov. Sulawesi Tengah Dalam Angka* (Vol. 55). Badan Pusat Statistik Prov. Sulawesi Tengah. http://scioteca.caf.com/bitstream/handle/123456789/1091/RED2017-Eng-8ene.pdf?sequence=12&isAllowed=y%0Ahttp://dx.doi.org/10.1016/j.regsciurbeco.2008.06.005%0Ahttps://www.researchgate.net/publication/305320484_Sistem_Pembetungan_Terpusat_Strategi_Melestari

Buanayuda, G. W., & Kusumawardani, N. W. S. (2020). *Kesehatan Wanita "Keputihan."* CV Garuda Mas Sejahtera.

Eriyani, N. R. (2023). Pengaruh Penggunaan Rebusan Air Daun Sirih Hijau (Green Betel Leaf) Pada Wanita Usia Subur Dengan Flour Albous Di PMB Hj.Masdewati Pohan Palembang. *Jurnal Ventilator*, *1*(4), 232–238. https://doi.org/10.59680/ventilator.v1i4.713

Etnis, R. B., & Maay, A. G. A. (2021). Pengaruh Rebusan Daun Sirih Hijau terhadap Penurunan Keputihan Patologis Wanita Usia Subur. *Window of Health : Jurnal Kesehatan*, *4*(4), 307–313. https://doi.org/10.33096/woh.v4i04.200

Helmi, S. T., Fajria, L., & Murni, D. (2023). *Pendidikan Sebaya Remaja Putri Tentang Flour Albus dengan Pendekatan Asuhan Keperawatan* (L. Fajria, Ed.). CV. Adanu Abimata.

Hermanto, L. O., Nibenia, J., Sharon, K., & Rosa, D. (2023). Review artikel: Pemanfaatan tanaman sirih (Piper betle L) sebagai obat tradisional. *Pharmaceutical Science Journal*, *3*(1), 33–42.

Kaparang, M. J., & Admasari, Y. (2022). *Pemanfaatan Air Rebusan Daun Sirih Hijau (Pipper bettle L.) Untuk Penyembuhan Keputihan (Fluor Albus)*. *10*(3).

Permenkes. (2025). *Permenkes RI No. 2 Tentang Penyelenggaraan Upaya Kesehatan Reproduksi*. 1–23.

Sadiah, H. H., Cahyadi, A. I., & Windria, S. (2022). Kajian Daun Sirih Hijau (Piper betle L) Sebagai Antibakteri. *Jurnal Sain Veteriner*, *40*(2), 128. https://doi.org/10.22146/jsv.58745

Septiawati, D. (2021). Pentalaksanaan Keputihan Patologis pada Remaja. *Jurnal Ngudia Husada Madura*, *1*(2–3), 13–14. https://repository.stikesnhm.ac.id/id/eprint/821/1/18154010003-2021-MANUSKRIP.pdf

Suyenah, Y., & Dewi, M. K. (2022). *Efektivitas Penggunaan Rebusan Daun Sirih Hijau terhadap Kejadian Keputihan pada Remaja*. *01*, 160–165. https://doi.org/10.53801/sjki.v1i4.41

Wahyuni, S. W., Prasida, Y., Juni, E. D., & Nova, R. (2024). Pengaruh Penggunaan Daun Sirih Hijau Pada Wanita Usia Subur Dengan Keputihan. *Zona Kebidanan*, *15*(1).

WHO. (2024a). *Adolescent health*. https://www.who.int/health-topics/adolescent-health#tab=tab_1

WHO. (2024b). *Bacterial vaginosis*. https://www.who.int/news-room/fact-sheets/detail/bacterial-vaginosis

WHO. (2024c). *Chlamydia*. https://www.who.int/news-room/fact-sheets/detail/chlamydia

WHO. (2024d). Recommendations for the treatment of Trichomonas vaginalis, Mycoplasma genitalium, Candida albicans, bacterial vaginosis and human papillomavirus (anogenital warts). Dalam *Recommendations for the treatment of Trichomonas vaginalis, Mycoplasma genitalium, Candida albicans, bacterial vaginosis and human papillomavirus (anogenital warts)*. https://doi.org/10.2471/b09108

WHO. (2024e). *Trichomoniasis*. https://www.who.int/news-room/fact-sheets/detail/trichomoniasis