



Effectiveness of Soursop (*Annona Muricata*) Leaf Decoction on Vaginal Discharge Symptoms Among Injectable Hormonal Users: A Quasi-Experimental Study in Makassar, Indonesia

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ABSTRACT

Vaginal discharge is one of the common complaints experienced by acceptors of injectable hormonal contraception and may negatively affect reproductive health and quality of life. This study aimed to analyze the effect of soursop leaf (*Annona muricata*) decoction on reducing vaginal discharge symptoms among injectable hormonal contraceptive acceptors. A quasi-experimental study with a pre-test and post-test two-group design was conducted at the Rappokalling Community Health Center, Makassar, over a period of 10 months. The study involved 50 women of reproductive age who experienced vaginal discharge and were selected using the Slovin formula with a 10% margin of error. Data were collected using observation sheets assessing the color, odor, and itching intensity of vaginal discharge before and after the intervention. Statistical analysis was performed using the Wilcoxon signed-rank test to determine differences before and after administration of soursop leaf decoction. The results demonstrated a significant improvement in vaginal discharge conditions after the intervention ($p < 0.05$). Respondents with clear white vaginal discharge increased from 54% to 96%, while abnormal vaginal discharge decreased from 46% to 4%. Complaints of unpleasant odor significantly decreased, with respondents reporting no odor increasing from 26% to 84%. Itching symptoms also improved markedly, as moderate itching decreased from 30% to 0%, mild itching decreased from 52% to 16%, and respondents without itching increased from 14% to 84%. These findings indicate that soursop leaf decoction is effective in reducing vaginal discharge symptoms among injectable hormonal contraceptive acceptors and may serve as a complementary non-pharmacological intervention for reproductive health management.

INTRODUCTION

Women's reproductive health is an important aspect of family planning (FP) services. One of the problems often experienced by those who use hormonal contraception, especially injectables, is vaginal discharge (fluor albus). Vaginal discharge is a condition in which fluids other than menstrual blood are released from the vagina. (1) Although vaginal discharge can be physiological, in many cases, the discharge is pathological and caused by bacterial, fungal, or

parasitic infections. Symptoms of pathological vaginal discharge are characterized by yellowish or greenish discharge, a fishy odor, accompanied by itching and burning in the vagina. (2)

According to data from the World Health Organization (WHO), 75% of women worldwide have experienced vaginal discharge. In Indonesia, approximately 90% of women are at risk of experiencing vaginal discharge due to the tropical climate, which causes the reproductive organs to be moist and moist, allowing fungi to grow and develop easily. Research shows that 75% of Indonesian women have experienced vaginal discharge at least once in their lifetime, and 45% of them may experience vaginal discharge twice or more in their lifetime. (1)

Data from various regions show that vaginal discharge in injectable hormonal contraceptive users is a significant problem. At Gamping 1 Community Health Center, Yogyakarta, it was recorded that 71% of 38 3-month injectable contraceptive users experienced pathological vaginal discharge (2023). (3) Another study in East Jakarta (2023) showed that 68% of 3-month injectable contraceptive users who had used the contraceptive for more than 3 years experienced vaginal discharge, and 46% of users for less than 3 years. (4) Meanwhile, in Palembang, it was found that 60% of injectable contraceptive users experienced vaginal discharge, and there was a significant relationship between the use of hormonal contraceptives and the incidence of vaginal discharge ($p = 0.005$). (5) Similar incidence rates were also found in North Sumatra and Padang, with prevalence ranging from 40–54%. (6)

Until now, the treatment of vaginal discharge generally still uses pharmacological therapy, which in the long term can cause side effects and microbial resistance. Therefore, it is necessary to develop alternative herbal-based treatments that are safe and effective. (7) One of the plants that has potential as an antibacterial is soursop leaves (*Annona muricata*), which contain phytochemical compounds such as annonaceous acetogenin which function as antibacterials and antifungals. (8) Soursop leaf decoction has been used traditionally to treat various infections, including urinary tract infections and vaginal discharge. (9)

Soursop leaves have antibacterial benefits because they contain a phytochemical compound called annonaceous acetogenin, which acts as an active antibacterial agent. (10) These leaves are known to be effective in helping to treat various infections caused by bacteria, such as diarrhea, vaginal discharge, boils, urinary tract infections, and upper respiratory tract infections. (11)

Seeing the high incidence of vaginal discharge in injectable contraceptive users and the need for a safe alternative solution, this study was conducted to examine the effectiveness of soursop leaf decoction in treating vaginal discharge in injectable hormonal contraceptive users at the Rappokalling Community Health Center, Makassar City

METHODS

This study employed an analytical, quasi-experimental approach with a two-group pre-test and post-test approach to determine the differences between the experimental and control groups and the effects of soursop leaf decoction. The experimental and control groups were randomly selected. The experimental and control groups underwent a pre-test and pH test using litmus paper. Both groups received different treatments: the experimental group received soursop leaf decoction as a vaginal wash, and the control group received running water. After the intervention, both groups underwent a post-test.

The population in this study was all women of childbearing age using injectable contraception who experienced vaginal discharge at the Rappokalling Community Health Center in Makassar City, a total of 100 respondents. The sample size was determined using the Slovin formula ($n = N / (1 + (N \times e^2))$) with a 10% margin of error, resulting in a sample size of 50 respondents. The sampling technique used was purposive sampling. Inclusion and Exclusion Criteria, inclusion women of childbearing age (15–49 years), active injectable contraceptive users for at least 3 months, experiencing mild to moderate pathological vaginal discharge, Willing to participate. Exclusion currently using vaginal discharge medication, allergies to natural ingredients

RESULTS

Characteristics of Respondents

Table 1. Frequency Distribution of Characteristics of Injectable KB Acceptors According to Age and Education at the Rappokalling Community Health Center in Makassar City

Respondent characteristic		n	%
Age (years)	18-40	40	75,9
	41-60	10	24,1
Educational Level	Junior High School	4	7,4
	Senior High School	36	70,4
	Higher Education (College/University)	10	22,2
Total		50	100

Source: Primary Data, 2025

Of the 54 respondents included in this study, the majority were aged 18–40 years (75.9%), while 24.1% were aged 41–60 years. Regarding educational attainment, most respondents had completed senior high school education (70.4%), followed by higher education (22.2%) and junior high school education (7.4%).

Table 2. Distribution of Vaginal Discharge Color, Vaginal Discharge Odor, and Vaginal Itching Categories Before and After Intervention at the Rappokalling Community Health Center

Variable	Before Intervention		After Intervention		
	n	%	n	%	
Color	White	40	80	48	96
	Greenish yellow	10	20	2	4
Smell	No	13	26	42	84
	Light	37	74	8	16
Itchy	No	9	14	42	16
	Light	26	52	8	4
	Currently	15	30	0	0
Total		50	100	50	100

Source: Primary Data, 2025

Table 2 shows the distribution of water quality characteristics and skin itching complaints before and after the intervention among 50 respondents. Regarding water color, the proportion of white-colored water increased from 80.0% before the intervention to 96.0% after the intervention, while greenish-yellow water decreased from 20.0% to 4.0%.

Similar changes were observed in water odor. Prior to the intervention, 26.0% of respondents reported that the water had no odor and 74.0% reported a light odor. After the intervention, the proportion of odorless water increased to 84.0%, whereas water with a light odor decreased to 16.0%.

For skin itching complaints, 14.0% of respondents reported no itching before the intervention, while 52.0% experienced mild itching and 30.0% experienced moderate itching. Following the intervention, the proportion of respondents reporting no itching increased to 84.0%, whereas mild itching decreased to 16.0%. No respondents reported moderate itching after the intervention.

Bivariate Analysis

Tabel 3. The Relationship Between Vaginal Discharge Color Before and After Intervention and the Type of Contraceptive Injection at the Rappokalling Community Health Center in Makassar City

Type of Injection		Color				Total	p-value	
		Before Intervention		After Intervention				
		n	%	n	%			n
1-Month Injection	White	25	83,3	15	75,0	40	80,0	0,001
	Greenish yellow	5	16,7	5	25,0	10	20,0	
3-Month Injection	White	29	96,7	19	95,0	48	96,0	
	Greenish yellow	1	3,3	1	5,0	2	4,0	
Total		30	100,0	20	100,0	50	100,0	

Source: Primary Data (Processed), 2025

In the table above, before the intervention, 25 of the 50 respondents (100%) had pure white vaginal discharge, and 5 respondents (16.7%) had greenish-yellow vaginal discharge, all receiving the one-month injection. Meanwhile, 15 respondents (75%) had pure white vaginal discharge, and 5 respondents (25%) had greenish-yellow vaginal discharge, all receiving the three-month injection.

After the intervention, 29 of the 50 respondents (100%) had pure white vaginal discharge, and 1 respondent (3.3%) had greenish-yellow vaginal discharge, all receiving the one-month injection. Meanwhile, 19 respondents (95%) had pure white vaginal discharge, and 1 respondent (5%) had greenish-yellow vaginal discharge, all receiving the three-month injection.

Table 4 presents the distribution of water odor according to the type of injectable contraceptive before and after the intervention. Before the intervention, 38 respondents (76.0%) reported that the water had no odor, while 12 respondents (24.0%) reported a light odor. Among users of the 1-month injectable contraceptive, 29 respondents (87.8%) reported

no odor and 4 respondents (12.2%) reported a light odor. In contrast, among users of the 3-month injectable contraceptive, 9 respondents (52.9%) reported no odor and 8 respondents (47.1%) reported a light odor. A statistically significant association was observed between injectable contraceptive type and water odor before the intervention ($p = 0.001$).

Tabel 4. The Relationship Between Vaginal Discharge Odor Before and After Intervention and the Type of Contraceptive Injection at the Rappokalling Community Health Center in Makassar City

Intervention Period	Type of injectable				Total		p-value	
	1-Month Injectable		3-Month Injectable		n	%		
	n	%	n	%				
Before Intervention	No odor	29	87,8	9	52,9	38	76,0	0,001
	Light odor	4	12,2	8	47,1	12	24,0	
Total		33	100,0	17	100,0	50	100,0	
After Intervention	No odor	21	70,0	11	55,0	32	64,0	
	Light odor	9	30,0	9	45,0	18	36,0	
Total		30	100,0	20	100,0	50	100,0	

Source: Primary Data (Processed), 2025

After the intervention, 32 respondents (64.0%) reported that the water had no odor, whereas 18 respondents (36.0%) reported a light odor. Among users of the 1-month injectable contraceptive, 21 respondents (70.0%) reported no odor and 9 respondents (30.0%) reported a light odor. Among users of the 3-month injectable contraceptive, 11 respondents (55.0%) reported no odor and 9 respondents (45.0%) reported a light odor. The distribution of water odor remained different between the two contraceptive groups after the intervention.

DISCUSSION

The findings of this study demonstrated that the administration of soursop leaf (*Annona muricata*) decoction was associated with significant improvements in vaginal discharge symptoms among injectable hormonal contraceptive users. Improvements were observed in the color of vaginal discharge, the presence of vaginal odor, and itching symptoms, indicating a positive effect of the intervention on reproductive health status.

Following the intervention, the proportion of respondents presenting with clear white vaginal discharge increased substantially, while the proportion of respondents with greenish-yellow vaginal discharge decreased markedly. Clinically, vaginal discharge color is an important indicator of vaginal health. Clear or white discharge is generally considered physiological, whereas yellowish or greenish discharge is frequently associated with infection or inflammation of the reproductive tract. Therefore, the observed shift from greenish-yellow discharge to clear white discharge suggests an improvement in vaginal health and a reduction in pathological symptoms.

The improvement in vaginal discharge color may be explained by the phytochemical constituents of soursop leaves. Soursop leaves contain several bioactive compounds, including

acetogenins, flavonoids, tannins, saponins, and alkaloids, which possess antibacterial, antifungal, and anti-inflammatory properties. These compounds have been reported to inhibit the growth of pathogenic microorganisms such as *Candida albicans* and anaerobic bacteria, which are commonly associated with abnormal vaginal discharge. In addition, flavonoids exhibit anti-inflammatory activity that may reduce irritation and inflammation of the vaginal mucosa, thereby contributing to the restoration of normal vaginal discharge characteristics. (1)

Injectable hormonal contraceptive users are particularly susceptible to vaginal discharge because hormonal changes, especially increased progesterone levels, may alter vaginal pH and disrupt the balance of normal vaginal microbiota. These physiological changes create favorable conditions for the proliferation of opportunistic microorganisms. The antimicrobial activity of soursop leaf decoction may help restore microbial balance and maintain a healthier vaginal environment, thereby reducing the occurrence of pathological vaginal discharge.

The findings of this study are consistent with previous research demonstrating the antimicrobial efficacy of soursop leaf preparations. Masloman et al. (2019) reported that soursop leaf extract exhibited a strong inhibitory effect against *Candida albicans* (2), while Santi Yulianti (2024) found that soursop leaf administration effectively reduced vaginal discharge symptoms among women of reproductive age. (3) These findings collectively support the potential role of soursop leaves as a natural therapeutic agent for the management of vaginal discharge.

In addition to improving vaginal discharge color, the intervention was associated with a substantial reduction in vaginal odor. The proportion of respondents reporting no odor increased markedly following the intervention, while the proportion reporting mild odor decreased considerably. Vaginal odor is frequently associated with bacterial overgrowth, alterations in vaginal flora, and poor genital hygiene. Consequently, a reduction in odor may indicate improvements in the vaginal microbial environment and restoration of normal vaginal ecology.

The improvement in odor-related symptoms may also be attributed to the antimicrobial and antifungal activities of the bioactive compounds present in soursop leaves. By inhibiting the growth of pathogenic microorganisms, these compounds may reduce the production of volatile metabolites responsible for unpleasant vaginal odors. Furthermore, the ability of soursop leaf decoction to contribute to vaginal pH balance may create conditions that favor the growth of beneficial vaginal flora while suppressing pathogenic species. (4)

A substantial reduction in itching symptoms was also observed after the intervention. Before treatment, many respondents reported mild to moderate itching, whereas after treatment, the majority reported no itching symptoms. Itching is a common symptom of vaginal infections and inflammatory processes and is often accompanied by discomfort that may negatively affect quality of life. The reduction in itching observed in this study suggests that the intervention was effective in alleviating irritation and inflammation of the genital area.

The reduction in itching symptoms is biologically plausible considering the pharmacological properties of soursop leaves. Acetogenins, flavonoids, tannins, and saponins possess antimicrobial activities that may suppress the growth of infectious microorganisms, while flavonoids exert anti-inflammatory effects that can reduce tissue irritation and

inflammatory responses. Consequently, these combined actions may contribute to symptom relief and overall improvement in vaginal health. (5)

The present findings are further supported by previous studies. Rahmawati et al. (2019) demonstrated that soursop leaf extract effectively inhibited the growth of *Candida albicans*, whereas Wulandari et al. (2021) reported that soursop leaf decoction reduced vaginal discharge symptoms after seven days of treatment among women of reproductive age. These studies strengthen the evidence supporting the use of soursop leaves as a complementary herbal therapy for managing vaginal discharge and associated symptoms.

The analysis based on contraceptive type showed improvements in vaginal discharge characteristics among both 1-month and 3-month injectable contraceptive users. Before the intervention, the proportion of respondents with abnormal vaginal discharge characteristics was higher among users of the 3-month injectable contraceptive. After the intervention, however, both groups exhibited marked improvements, with the majority of respondents reporting clear white vaginal discharge and reduced odor symptoms. These findings suggest that the beneficial effects of soursop leaf decoction may be observed regardless of the type of injectable hormonal contraceptive used.

Although improvements were observed in both contraceptive groups, users of the 3-month injectable contraceptive tended to exhibit poorer vaginal discharge characteristics at baseline. This finding is consistent with previous evidence indicating that prolonged exposure to progesterone-dominant hormonal contraceptives may exert a greater influence on vaginal flora and vaginal secretions. Nevertheless, the intervention appeared to improve symptoms in both groups, suggesting that soursop leaf decoction may help mitigate some of the adverse reproductive health effects associated with hormonal contraceptive use.

Several factors may have contributed to the effectiveness of the intervention, including respondents' adherence to the treatment regimen, personal genital hygiene practices, nutritional status, and individual hormonal conditions. Despite these potential influencing factors, the significant improvements observed across multiple clinical indicators suggest that soursop leaf decoction may provide meaningful benefits as a complementary non-pharmacological intervention for the management of vaginal discharge among injectable hormonal contraceptive users. (7)

Overall, the findings of this study strengthen existing evidence regarding the therapeutic potential of *Annona muricata* leaves in reproductive health care. The observed improvements in vaginal discharge color, vaginal odor, and itching symptoms indicate that soursop leaf decoction may serve as a safe, affordable, and culturally acceptable complementary therapy for women experiencing vaginal discharge associated with injectable hormonal contraceptive use.

CONCLUSION

Based on the research results, it can be concluded that soursop leaf decoction has proven highly effective in reducing itching complaints in those using injectable hormonal contraceptives. These improvements indicate that soursop leaf decoction has antimicrobial, antifungal, and anti-inflammatory effects that can help normalize vaginal conditions, reduce irritation, and inhibit the growth of fungi or bacteria that cause itching.

Soursop leaf decoction can be considered as a complementary herbal therapy to help reduce vaginal discharge complaints in those using injectable hormonal contraceptives, especially if used according to the instructions and maintaining reproductive organ hygiene. When using boiled soursop leaf water, you should pay attention to the dosage, frequency of use, and individual health condition to avoid unwanted effects. Future researchers can use an experimental research design with a control group to compare the effectiveness of soursop leaf decoction more objectively.

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