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Original Article

Relationship Between the Use of Pantyliners and Feminine Cleansing Soap on the Incidence of Leucorrhea Among Women of Reproductive Age in Kebon Jeruk Village, Bandar Lampung, Indonesia

Ana Mariza[1]*, Sunarsih[1], Susilawati[2]
[1]Bachelor of Midwifery, Malahayati University, Lampung, Indonesia
[2]Midwifery Professional Programme, Malahayati University, Lampung, Indonesia
*Corresponding Author: anamariza@malahayati.ac.id

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ABSTRACT

Background: Leucorrhea (vaginal discharge) is not a disease itself but a clinical manifestation of various gynecological conditions. It is reported that approximately 90% of cervical cancer cases are accompanied by leucorrhea. A preliminary survey conducted in July 2024 in Kebon Jeruk Village, Bandar Lampung, found that 205 out of 345 women of reproductive age experienced symptoms of leucorrhea. Inappropriate genital hygiene practices, including frequent use of pantyliners and feminine cleansing soap, are suspected risk factors for this condition.
Methods: This study employed a quantitative cross-sectional design. The study population consisted of 345 women of reproductive age, with 205 participants selected using purposive sampling. Data were collected through structured interviews using validated questionnaires. Bivariate analysis was performed using the chi-square test. Ethical approval was obtained from the Health Research Ethics Commission (No. 4557/EC/KEPP-UNMAL/IX/2024)
Results: The results showed a statistically significant association between frequent pantyliner use and the incidence of leucorrhea (p = 0.007; OR = 5.098). Similarly, frequent use of feminine cleansing soap was significantly associated with leucorrhea (p < 0.001; OR = 4.203). Women who frequently used pantyliners and feminine cleansing soap had a higher likelihood of experiencing leucorrhea compared to those who did not use these products.
Conclusion: Frequent use of pantyliners and feminine cleansing soap is significantly associated with an increased incidence of leucorrhea among women of reproductive age. Health education programs should emphasize appropriate genital hygiene practices and discourage excessive use of pantyliners. Carrying spare underwear is recommended as a safer alternative to routine pantyliner use to reduce the risk of leucorrhea.

INTRODUCTION

Leucorrhea (vaginal discharge) is a common gynecological symptom experienced by women across different age groups and reproductive stages (Andriyani et al., 2024). Although physiological leucorrhea can occur as part of normal reproductive function, pathological leucorrhea may indicate underlying infections or gynecological disorders and, if left untreated, can lead to serious complications, including infertility and ectopic pregnancy (Armini, 2022) (Sulistiyanti et al., 2022)(A. S. Mariza, 2023) (Nisa & Yudha, 2024). Moreover, persistent abnormal vaginal discharge has been reported as an early clinical manifestation in a substantial

proportion of cervical cancer cases, highlighting its public health relevance (Sartika et al., 2025) (Nisa & Yudha, 2024) (Sofiyah & Andarwulan, 2021).

Women of reproductive age are particularly vulnerable to leucorrhea due to hormonal fluctuations and behavioral factors related to genital hygiene practices (Andriyani et al., 2024) (Sunarsih, 2025). Personal hygiene behaviors play a crucial role in maintaining the vaginal ecosystem, which is naturally protected by a balance of normal flora and acidic pH. Disruption of this balance may facilitate the growth of pathogenic microorganisms, leading to abnormal vaginal discharge(Andriyani et al., 2024)(Yulia, Eli Nita, 2022).

Several studies have suggested that inappropriate hygiene practices, including excessive use of feminine cleansing products and pantyliners, may be associated with an increased occurrence of pathological leucorrhea (Sartika et al., 2025) (Nurhaliza, 2023). The frequent use of vaginal cleansing agents, especially those containing antiseptic or fragrance components, has been shown to disrupt normal vaginal microflora and cause mucosal irritation, thereby increasing susceptibility to bacterial and fungal infections (A. Mariza et al., 2015)(Utami, Sri. mariza, 2025). Similarly, prolonged or frequent use of pantyliners may create a warm and moist environment that supports microbial growth, particularly when pantyliners are not changed regularly (Karo et al., 2021) (Sunarsih, 2025) (Ratna et al., 2023) (A. S. Mariza, 2023) .

Empirical evidence supports this association. A study reported that women who did not use feminine hygiene products were less likely to experience vaginal discharge, possibly due to better preservation of vaginal pH and normal flora (Karo et al., 2021) . Other studies among adolescents and women of reproductive age have also identified significant associations between vaginal cleansing behaviors (Andriyani et al., 2024), use of pantyliners, and the occurrence of pathological leucorrhea (Maysaroh et al., 2021) (Kirana et al., 2022).However, most existing studies have focused on adolescents or clinical populations, with limited attention to community-based adult women in rural or semi-urban settings(Aurellia & Nainggolan, 2004) (Monintja & Anandani, 2020) (A. S. Mariza, 2024).

Globally, it is estimated that approximately 75% of women experience leucorrhea at least once in their lifetime, and nearly half may experience recurrent episodes In tropical countries such as Indonesian (Admasari et al., 2025), the prevalence of vaginal discharge is reportedly higher due to climatic conditions that favor fungal and bacterial growth (Ratna et al., 2023). Additional contributing factors include inadequate personal hygiene, limited access to health information, and low awareness regarding reproductive health maintenance (Mulyanti, 2025) (Ratna et al., 2023) (Widyawati & Rahariyani, 2025)(A. S. Mariza, 2023).

A preliminary survey conducted in July 2024 in Kebon Jeruk Village, Bandar Lampung, revealed that 205 out of 345 women of reproductive age reported symptoms consistent with pathological leucorrhea, including itching, malodor, and abnormal discharge color. Despite the high prevalence, data examining behavioral hygiene factors—particularly pantyliner use and feminine cleansing soap use—within this community remain limited.

Therefore, this study aims to examine the association between the use of pantyliners and feminine cleansing soap and the incidence of leucorrhea among women of reproductive age in Kebon Jeruk Village, Bandar Lampung. By focusing on a community-based population and specific hygiene behaviors, this study seeks to contribute empirical evidence to clarify behavioral risk factors associated with leucorrhea, while acknowledging the limitations inherent to cross-sectional observational designs.

METHODS

This study employed a quantitative observational design with a cross-sectional approach. The research was conducted in Kebon Jeruk Village, Bandar Lampung, Indonesia, in 2024. The study population consisted of all women of reproductive age (20–45 years) residing in Kebon Jeruk Village during the study period, totaling 345 individuals. A sample of 205 participants was included in the analysis.

The sample size was determined based on the available population and feasibility considerations, aiming to include a substantial proportion of eligible women to increase

statistical precision. Although no formal power calculation was performed, the sample represented approximately 59% of the total target population, which is considered adequate for exploratory cross-sectional analysis.

Purposive sampling was used to recruit participants who met predefined inclusion criteria. Inclusion criteria were: women aged 20–45 years, pre-menopausal status, and willingness to participate. Exclusion criteria included a self-reported history of diagnosed gynecological disease, presence of degenerative diseases, or current use of pharmacological therapy that could affect vaginal symptoms. The use of purposive sampling limits the generalizability of findings beyond the study population and may introduce selection bias. Therefore, the results of this study should be interpreted as associations within the sampled community rather than population-wide causal inferences.

The dependent variable was leucorrhea, defined as self-reported symptoms of abnormal vaginal discharge. Leucorrhea was assessed using a symptom-based questionnaire consisting of five indicators: abnormal odor (fishy or foul smell), genital itching, abnormal discharge color (yellowish, greenish, or grayish),burning or heat sensation in the genital area, and excessive discharge requiring underwear changes more than twice per day.

Participants reporting one or more of these symptoms were classified as having symptoms consistent with leucorrhea. No microbiological examination or gynecological assessment was performed; therefore, the outcome reflects self-reported symptoms rather than clinically confirmed infection.

The independent variables were pantyliner use and feminine cleansing soap use. Pantyliner use was categorized based on frequency and duration of use, including frequency of daily use, duration of continuous use (>4 hours), and use of scented pantyliners. Participants were classified as *high-frequency pantyliner users* (≥4 times/day) or *non/low-frequency users* (<4 times/day).

Feminine cleansing soap use was assessed based on the frequency of use of commercial feminine hygiene products, including cleansing soap, perfumed tissues, powders, or genital sprays. Participants were categorized as *frequent users* (≥2 times/day) or *non/occasional users* (<2 times/day). These cut-off points were selected based on patterns observed in previous hygiene behavior studies and practical relevance in the local context, although standardized international scales were not available.

Data were collected through face-to-face interviews using a structured questionnaire developed by the research team based on existing literature on vaginal hygiene and leucorrhea. The questionnaire consisted of sections on demographic characteristics, hygiene behaviors, and self-reported vaginal symptoms.

The instrument underwent content review by academic experts in midwifery and public health to ensure face and content validity. However, no formal psychometric testing (e.g., Cronbach's alpha) or pilot testing was conducted prior to data collection, which represents a limitation of the study. Prior to analysis. Incomplete questionnaires were excluded from the final analysis. No imputation was performed for missing data.

Univariate analysis was conducted using frequency distributions to describe respondent characteristics and variable distributions. Bivariate associations between hygiene behaviors and leucorrhea were analyzed using the chi-square test, with statistical significance set at $p < 0.05$. Multivariate analysis was conducted using logistic regression to estimate adjusted odds ratios. Potential confounding variables such as sexual activity, contraceptive use, and menstrual hygiene practices were not included in the analysis due to data limitations and should be considered in future studies.

This study received ethical approval from the Health Research Ethics Commission (No. 4557/EC/KEPP-UNMAL/IX/2024). Written informed consent was obtained from all participants prior to data collection.

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RESULTS

This cross-sectional study was conducted in Kebon Jeruk Village, Bandar Lampung, in 2024. Of the total population of 345 women of reproductive age, 205 participants met the inclusion criteria and were included in the analysis. Among them, 147 women (71.7%) reported symptoms consistent with leucorrhea, while 58 women (28.3%) did not report such symptoms.

Table 1 presents the distribution of pantyliner use and feminine cleansing soap use among study participants. Most respondents reported frequent pantyliner use (≥4 times/day), accounting for 180 participants (87.8%). Frequent use of feminine cleansing soap (≥2 times/day) was reported by 110 participants (53.6%). The overall prevalence of self-reported leucorrhea symptoms in the study population was 71.7%.

Table 1. Characteristics of women of reproductive age

Variables	Characteristic	n	%
Age	20-35	108	52.7
	36- 55	97	47.3
Education	Basic	46	22.4
	Secondary	68	33.2
	High	91	44.4
Occupation	Working	122	59.5
	Not Working	83	40.5
Parity	Nullipara	48	23.5
	Multipara	153	74.6
	Grandemultipara	4	1.9
Use of contraception	Not Using Contraseption	21	10.2
	Hormonal contraception	144	70.2
	Non Hormonal contraception	40	20.6
History of pathological vaginal discharge	Any history	67	32.7
	Not Any history	138	67.3
Menstrual cycle	Reguler	170	82.9
	Not Reguler	35	17.1
History of dysmenorrhea	Any history	56	27
	Not Any history	149	73
Smoking history	Any history	3	1.4
	Not Any history	202	98.6
Frequency of changing sanitary napkins during menstruation	Every 4-6 hours	49	23.9
	More than > 6 Hours	156	76.1

Table 1 explains that the study was conducted on 108 people with age 20-35 years. The results showed that the majority of respondents (45%) were high education and more than half (60%) of respondents were as working woman with the majority (75%) parity as multipara. Based on use of contraception characteristics were as hormonal contraception (70%). For reproduction characteristics almost (67%) not any History of pathological vaginal discharge, regular menstrual cycle with more than half (83%), not any History of dysmenorrhea (73%), almost all respondents not any history pf smoking (98,6%), and Frequency of changing sanitary napkins during menstruation were more than 6 hours with the majority (76%).

Table 2. Univariat Analysis of factors Associated with the Leuchorrhea

Variables	n	%
Use of pantyliners		
Often (≥4x/day)	180	87.8
Never	25	12.2
Use Of Feminine Cleansing Soap		
Often (≥2x/day)	110	53.6
Never	95	46.4

Based on Table 2, it can be seen that the majority of respondents were in often using of pantyliners more than 4x/day, totaling 180 respondents (87.8%), while those never using of pantyliners group comprised 25 respondents (12.12). Most respondents also often using of feminine cleansing soap (≥2), with 110 respondents (53.6%), whereas never using about was found in 95 respondents (46.4%). These findings indicate that the majority of women in the study sample were within the reproductive often using of pantyliners and femininie cleansing soap that cause incidence of leucorrhea.

Additional subgroup analyses were performed descriptively to explore patterns of leucorrhea symptoms across different levels of pantyliner and feminine cleansing soap use. Higher proportions of leucorrhea symptoms were observed among women who reported pantyliner use ≥4 times/day and feminine cleansing soap use ≥2 times/day.

However, no formal interaction terms or stratified statistical tests were conducted to evaluate effect modification. Therefore, these subgroup findings should be interpreted as descriptive observations rather than confirmatory evidence of differential risk across subgroups.

Table 3. Cross-tabulation of Risk Factors for Leucorrhea among women of reproductive age

Variables	Incidence of Leucorrhea				p-value
	Case		Control		
	n(147)	%(100)	n(58)	% (100)	
Use of pantyliners					
Often (≥4x/day)	130	73.3	50	26.7	0.007
Never	17	80	8	20	
Use Of Feminine Cleansing Soap					
Often (≥2x/day)	90	63.3	20	36.7	<0.001
Never	57	86.9	38	13.1	

Based on Table 3, respondents who are in the category of often using pantyliners, as many as 22 (73.3%) experienced leucorrhea. While for the good category who never as many as 8 (80%) respondents experienced leucorrhea.. Statistical analysis showed a p-value of 0.007 (<0.05) with an Odds Ratio (OR) of 5.081, indicating that women in which often using of pantyliners were 5 times more to get incidence of leucorrhea compared to those in the group that never using. Regarding feminine cleansing soap, respondents with often using (≥32) who developed leucorrhea were of the 25 respondents in the bad category as many as 18 (63.3%) experienced leucorrhea, and those in the good category 12 (86.9%) respondents experienced leucorrhea. The Chi-Square test revealed a p-value of <0.001 (<0.05) with an OR of 4.228, demonstrating that women who using of femninine cleansing soap had 4 times greater risk of developing leucorrhea compared to women who never using.

Table 4. Multivariate Analysis of Risk Factors For Leucorrhea among women of reproductive age

Variables	p-value	AOR	95%CI	
			Lower	Upper
Use of pantyliners				
Often (≥4x/day)	0.007	5.1	1.7	9.3
Never				
Use Of Feminine Cleansing Soap				
Often (≥2x/day)	<0.001	4.2	1.6	8.9
Never				

Table 4 presents the results of the multivariate analysis of risk factors for leucorrhea among women of reproductive age in Kebon Jeruk Regency. The analysis shows that use of pantyliners is a significant predictor of leucorrhea, with being 5.098 times more likely to be leucorrhea than never (AOR = 5.098, 95% CI: 1.722–9.274, p = 0.007). Additionally, use of feminine cleansing sop is another significant factor with more than 2x/day are 4.203 times

more likely to experience leucorrhea compared to those who never use feminine hygiene (AOR = 4.203, 95% CI: 1.626–8.994, p = <0.001).

DISCUSSION

Interpretation of Main Findings

This study identified statistically significant associations between frequent pantyliner use, frequent use of feminine cleansing soap, and the presence of self-reported leucorrhea symptoms among women of reproductive age in Kebon Jeruk Village. Rather than reiterating numerical results, these findings should be interpreted within a broader biological and behavioral context.

One plausible explanation for the observed association with pantyliner use relates to the microenvironment of the vulvovaginal area. Frequent or prolonged pantyliner use may increase local humidity and temperature, which can disrupt the balance of the vaginal microbiota and favor the growth of pathogenic bacteria or fungi (A. S. Mariza, 2023). This mechanism has been described in clinical and microbiological literature, which emphasizes the importance of airflow and moisture control in maintaining vulvovaginal health. However, it is important to note that the present study did not assess vaginal pH or microbiological profiles, and therefore cannot confirm this mechanism directly (A. S. Mariza, 2024) (Armini, 2022) (Charisma et al., 2024) .

Similarly, frequent use of feminine cleansing soap may alter the natural vaginal ecosystem. The vagina maintains a protective acidic pH and a Lactobacillus-dominant microbiome that inhibits pathogenic organisms (Sulistiyanti et al., 2022). Excessive exposure to cleansing agents, especially those containing antiseptics or fragrances, may disrupt this balance by reducing beneficial bacteria and increasing mucosal irritation (Kirana, 2022). This biological pathway is supported by broader clinical perspectives, including international guidance that discourages routine internal or frequent external use of vaginal cleansing products in the absence of medical indication.

Importantly, the associations observed in this study reflect correlations rather than causal relationships. Due to the cross-sectional design, it is not possible to determine whether hygiene behaviors preceded the onset of leucorrhea symptoms or were adopted in response to them.

Comparison with Previous Studies and Broader Evidence

The findings of this study are generally consistent with several previous observational studies reporting associations between hygiene practices and abnormal vaginal discharge. However, most existing evidence—particularly from local or regional studies—relies on similar cross-sectional designs and self-reported measures. While these studies support a pattern of association, they do not establish causality.

In contrast, international public health and clinical guidelines, including those referenced by global health organizations, emphasize that routine use of feminine hygiene products is not medically necessary and may be harmful if it disrupts the vaginal microbiome (Purwanti, 2022). Some international studies have reported no benefit—or even potential harm—from frequent use of vaginal cleansing products, suggesting that the relationship between hygiene behaviors and vaginal symptoms may be complex and context-dependent (Charisma et al., 2024).

Notably, contrasting evidence also exists. Some women report using pantyliners or cleansing products in response to existing discharge or discomfort, which raises the possibility of reverse causation. This alternative explanation cannot be excluded in the present study and should be considered when interpreting the findings.

Subgroup Analysis and Interpretation

Although descriptive subgroup patterns suggested higher proportions of leucorrhea symptoms among women with more frequent pantyliner and cleansing soap use, these findings should be interpreted cautiously. No adjustment was made for potential confounders such as sexual activity, contraceptive use, menstrual hygiene practices, or socioeconomic status. Additionally, no formal interaction or stratified analyses were conducted. As such, subgroup

observations are exploratory and should not be interpreted as evidence of differential risk across subpopulations.

Public Health Implications

From a public health perspective, the findings underscore the need for balanced and evidence-based education on genital hygiene. Rather than promoting or discouraging specific products outright, health education programs should emphasize maintaining the natural vaginal environment, avoiding excessive or unnecessary use of cleansing agents, and seeking medical evaluation for persistent or abnormal symptoms.

Given the study's design and limitations, specific behavioral recommendations—such as routine avoidance of pantyliners or alternative practices—should be made cautiously and in alignment with established clinical guidelines. The present findings support awareness-raising and counseling rather than prescriptive behavioral mandates.

Strengths and Limitations

This study provides community-based data on hygiene behaviors and leucorrhea symptoms among adult women in a specific local setting, contributing to the limited literature in non-clinical populations. However, several limitations must be acknowledged.

First, the use of purposive sampling limits external validity and generalizability beyond the study population. Second, the reliance on self-reported symptoms and hygiene behaviors introduces the potential for recall bias and misclassification. No gynecological examination or microbiological confirmation was performed, so leucorrhea was not clinically diagnosed. Third, key confounding variables—such as sexual behavior, contraceptive use, menstrual hygiene practices, and socioeconomic factors—were not measured or controlled for. Finally, the cross-sectional design precludes any inference of temporal or causal relationships.

Recommendations for Future Research

Future studies should employ longitudinal or case–control designs to better assess temporal relationships and potential causality. Incorporating microbiological assessments, vaginal pH measurements, and validated hygiene behavior instruments would strengthen the biological interpretation of findings. Additionally, multi-center studies with probabilistic sampling methods would enhance generalizability and allow for more robust adjustment for confounding factors.

CONCLUSION

This study identified significant associations between frequent pantyliner use, frequent use of feminine cleansing soap, and self-reported leucorrhea symptoms among women of reproductive age in Kebon Jeruk Village, Bandar Lampung. Rather than demonstrating causality, these findings highlight behavioral hygiene patterns that coexist with a higher prevalence of vaginal discharge symptoms in this specific community setting.

Given the cross-sectional design, self-reported measurements, and non-probability sampling approach, the results should be interpreted with caution. The observed associations may reflect behavioral responses to existing symptoms rather than antecedent risk factors. Nevertheless, the study contributes context-specific evidence suggesting that certain hygiene practices may be markers of vulnerability to vaginal health complaints among women of reproductive age. Importantly, this study underscores the need to view leucorrhea not merely as an isolated symptom but as part of broader reproductive health behaviors that warrant attention within community health education frameworks. The absence of microbiological confirmation, limited control for confounding variables, and reliance on self-reported hygiene behaviors restrict the ability to draw definitive conclusions regarding etiology.

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