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Potential of Soursop Leaf Extract Scrub as Antimicrobial

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ABSTRACT

Treatment of infectious diseases caused by bacteria has been carried out using antibiotics. However, the problem is resistance and even multi-resistance in bacteria. Preventive efforts are needed to anticipate, one of which is using soursop leaf extract scrub herbal products which contain gamma oryzanol compounds, flavonoids, phenols, and tannins as antimicrobials. This research is a pure experiment with one group pretest-posttest control design and positive and negative controls. The study aims to analyse the effectiveness of soursop leaf extract scrub products as antimicrobials on the skin of the respondents' arms before and after treatment. Antimicrobial counting uses the total plate count (TPC) method, with 118 respondents in-vivo, where the scrub is applied to the respondent's arm, measuring 10cm x 10cm for 10 minutes. The results of the data normality test with the Kolmogorov-Smirnov test obtained non-normally distributed data. The trial continued with a non-parametric test in the Wilcoxon test to get a significance value of $0.000 < 0.05$, which means that the soursop leaf extract scrub effectively reduces total bacteria count. The research may be helpful for the community in efforts to prevent skin infections caused by bacteria, and researchers need to conduct antibacterial tests for scrubs without soursop leaf extract as a comparison and conduct further tests such as safety tests, expiration periods and aesthetic tests on soursop leaf extract scrub products.

Keywords: antimicrobials; scrub; soursop leaf extract;

ABSTRAK

Pengobatan penyakit infeksi yang disebabkan oleh bakteri telah dilakukan pengobatan menggunakan antibiotik. Namun masalah yang muncul adalah terjadinya resisten bahkan multiresisten pada bakteri. Perlu upaya pencegahan untukantisipasi, salah satunya

menggunakan produk herbal lulur ekstrak daun sirzak yang mengandung senyawa *gamma oryzanol*, flavonoid, fenol, dan tannin sebagai antimikroba. Penelitian ini eksperimen murni dengan *one group pretest-posttest control design* serta control positif dan negatif. Penelitian bertujuan menganalisis efektivitas produk lulur ekstrak daun sirzak sebagai antimikroba pada kulit lengan responden sebelum dan sesudah perlakuan. Penghitungan antimikroba menggunakan metoda angka lempeng total (ALT), dengan 118 responden secara *in vivo*, dimana lulur dioleskan pada lengan responden ukuran 10cm x 10cm selama 10 menit. Hasil uji normalitas data dengan uji *Kolmogorov – smirnov* didapatkan data berdistribusi tidak normal. Uji dilanjutkan dengan uji non parametrik berupa uji *Wilcoxon* di dapatkan nilai signifikansi $0,000 < 0,05$ yang artinya lulur ekstrak daun sirzak efektif menurunkan angka kuman. Penelitian semoga bermanfaat bagi masyarakat dalam upaya pencegahan infeksi kulit yang disebabkan oleh bakteri dan peneliti perlu melakukan uji antibakteri lulur tanpa ekstrak daun sirzak sebagai pembanding serta melakukan uji lanjutan seperti uji keamanan, masa kedaluwarsa dan uji estetika pada produk lulur ekstrak daun sirzak.

Kata Kunci: antimikroba; lulur, ekstrak daun sirzak,

INTRODUCTION

Lulur is a type of traditional cosmetic made from ingredients and spices that are very useful for maintaining the skin's health, beauty and smoothness. Lulur is made from a mixture of rice, beans, turmeric root, ginger, cinnamon, and sandalwood powder pounded using a mortar and pestle. Next, the scrub is added with water and a few drops of jasmine flower oil. The jasmine oil will form fine granules. The components that make up the scrub are varied and have many properties. One of them is a compound that can potentially have antimicrobial activity, such as the *gamma oryzanol* compound. The *gamma oryzanol* compound is also found in rice. The *gamma oryzanol* compound can renew the formation of melanin

pigments as an antioxidant and effectively counteract ultraviolet rays. Traditional scrubs are enriched with functional compounds such as spices, turmeric, kencur, and bengkoang (Arbarini, 2015).

The study results of soursop leaf extract showed the presence of phytochemical content. Soursop leaf extract qualitatively positive contains antibacterial alkaloids, saponins and phenols. Soursop leaf extract quantitatively contains phenol (2554.22 mg/100g), flavonoids (5263.43 mg/100g) and tannin (1469.77 mg/100g). Soursop leaf extract has potential as an anti-microbial at various concentrations (Jirna, 2019). The results of antimicrobial activity are reinforced by the presence of antimicrobial

inhibition on extract scrub products. The soursop leaf test in-vitro results showed the most significant inhibition at a concentration of 25% by 8 mm (Sudarmanto et al., 2023).

This research by Rusmiyati et al. (2014) showed the presence of antibacterial power of soursop leaves (*Annona muricata* L) caused by the content of flavonoid compounds, saponins and tannins. The flavonoid compound is a phenolic group that can interfere with the function of bacterial organisms. Soursop leaf methanol extract's ability to inhibit *Staphylococcus aureus* bacteria at a concentration of 25% at 14.5 mm (Tuna et al., 2015).

This study aims to determine the effectiveness of 50% soursop leaf extract scrub products as antimicrobials on the skin of the respondents' arms before and after treatment.

METHOD

The type of research is True-experimental research, with a one-group pretest and posttest control design. Treatment of respondents in the form of one (1) gram of 50% soursop leaf extract scrub mixed with 0.5 ml of sterile distilled water was applied with a small

brush to the skin of each respondent's arm with a size of 10cm x 10cm for 10 minutes, and there was a control for respondents without treatment. Respondents in this study were TLM students of the Denpasar Health Polytechnic, 4th semester of the 2021/2022 academic year. Interventions for the treatment group included not doing strenuous activities such as sports not washing arm skin, and students were quarantined one (1) hour before treatment. Antimicrobial counting using the total plate count (TPC) method, with 118 respondents in-vivo. Sampling of respondents' arm skin swabs was taken twice, namely before and after treatment of the respondent group.

This study was conducted in two laboratories, namely Bina Medika laboratory for the ALT test, the Bacteriology and Applied Chemistry laboratory of Denpasar Polytechnic, and the Department of Medical Laboratory Technology for manufacturing soursop leaf extract scrub and sampling respondents. Wilcoxon statistical test to analyze the effectiveness of soursop leaf extract scrub products as antimicrobials in vivo.

RESULT AND DISCUSSION

1. Total Bacteria Count Before and After Using Soursop Leaf Extract Scrub

A comparison of the total bacteria count on the skin of the arms of respondents before and after using the soursop leaf extract scrub can be seen in the following table:

Table 1. Total Bacteria Count Before and After Applying Soursop Leaf Extract Scrub on The Arm of Skin Respondents

No.	Total bacteria count	Before Treatment (CFU/cm ²)	After Treatment (CFU/cm ²)
1	Highest total bacteria count	19	10
2	Lowest total bacteria count	10	0
3	Average total bacteria count	13,5	2,7
4	Total Respondent	118	118

The range of total bacteria count from 118 respondents before applying the soursop leaf extract scrub was 10 CFU/cm² - 19 CFU/cm², and the distribution of total bacteria count after applying the soursop leaf extract scrub for 10 minutes was 0 CFU/cm² - 10 CFU/cm², with a decrease in total bacteria count varying by 3 CFU/cm² - 17 CFU/cm².

The results showed that the highest total bacteria count on the skin of the respondent's arm before using the scrub was 19 cfu/cm² (table 1). Hands are a part of the body that often moves beside the feet. Hands are rarely protected from protective clothing. Hands are often used

to perform a large variety of activities every day. Bacteria and germs potentially contaminate hands. Contamination of hand skin by germs and bacteria is caused by factors originating from oneself and the environment. Contamination based on factors from oneself, caused by respondents' activities before using scrubs. In addition, contamination based on environmental factors comes from the air containing microorganisms in the environment.

The total bacteria count on the skin of the respondent's arm differs, and each respondent is not normally distributed. Total bacteria counts vary depending on

several factors, namely the last bathing time. The last bathing time factor affects the bacterial community on the limbs. The highest total bacteria count for respondents, the last time they bathed, was 3 hours before taking a swab of their arm skin. Meanwhile, the lowest total bacteria count was the respondent with the last shower time 1 hour before taking the arm skin swab. Other factors such as the type of activity, duration of activity and contact with other objects also contribute to varying the number of germs. Besides, the components of the body (hands) have normal flora (aphatogen bacteria) found on the skin (Walidah et al., 2014).

The total bacteria count after using the scrub was ten cfu/cm² (table 1). There

was a decrease in the average total bacteria count after using scrubs from 13.5 cfu/cm² to 2.7 cfu/cm². Scrubs are used in skin care to release dead skin cells and maintain and care for the skin's smoothness. So that the skin looks cleaner, brighter and smoother. (Ningsih et al., 2013) dan (Arbarini, 2015). The essential ingredients of the scrub are made from rice flour, which can increase collagen production improve skin elasticity and contain gamma oryzanol, which functions as an antioxidant. In addition to rice flour as the scrub's essential ingredient, there are turmeric, kencur, spices, and soursop leaf extract, which contain functional compounds (Sudarmanto et al., 2023).

2. Normality Test

The data normality test used in this study is the Kolmogorov-Smirnov test.

Table 2. Kolmogorov - Smirnov Data Normality Test

		TPC Before	TPC After
N		118	118
	Normal Parameters ^{a,b}	13.51	2.75
Most Extreme Differences	Absolute	.165	.435
	Positive	.165	.435
	Negative	-.115	-.252
Test Statistic		.165	.435
Asymp. Sig. (2-tailed)		.000 ^c	.000 ^c

Based on the data presented in Table 2, it can be seen that the significance (p-value) is 0.000 ($p < 0.05$), and it can be concluded that the data is not normally distributed. So, the analysis for hypothesis testing used is the Wilcoxon

test. The Wilcoxon test is used to analyze the results of paired observations of two data, whether there is a difference or not. Wilcoxon signed-rank test is used only for interval or ratio type data, but the data does not follow a normal distribution.

3. Effectiveness Test of Soursop Leaf Extract Scrub on Total Bacteria Count

The following table shows the results of the effectiveness of the soursop leaf extract scrub on total bacteria count using the Wilcoxon test:

Table 3. Effectiveness Test of Soursop Leaf Extract Scrub on Total Bacteria Count

	TPC after – TPC before
Z	-9.442 ^b
Asymp. Sig. (2-tailed)	.000

a. Wilcoxon Signed Ranks Test

Based on the Wilcoxon test data in Table 3, it can be seen that the Asymp. Sig. (2-tailed) is 0.000. This value is < 0.05 , so it can be concluded that the alternative hypothesis is accepted. This means there is a difference between the total bacteria count before and after using the soursop leaf extract scrub. So, it can also be concluded that soursop leaf extract scrub effectively reduces total bacteria count.

The statistical test results show a Sig value of 0.000 (table 3) < 0.05 , meaning the soursop leaf extract scrub effectively reduces the total bacteria count. Flavonoid content in scrubs can be an

antioxidant that can transfer an electron or a hydrogen atom to a free radical compound by stopping the initial stage of the reaction. Therefore, flavonoids can inhibit lipid peroxidation, suppress tissue damage by free radicals and inhibit several enzymes (Latifah, 2015). In addition to flavonoids, tannin content in cosmetic preparations can be antibacterial, which is a deterrent to bacterial growth for the cosmetic preparation itself and prevents acne on the skin caused by bacteria. Tannin compounds in scrubs can cool, clean,

eliminate unpleasant odors and are antibacterial (Prameswari, 2015).

The content of saponin compounds in traditional scrubs helps prevent dry skin and sunburn, reducing smallpox scars on the skin, preventing hair growth on facial skin, tightening the skin and evening out skin colour (Mutmainnah et al., 2021). The phenol content can also inhibit lipid oxidation by donating hydrogen atoms to free radicals. Phenol compounds can function as antioxidants because of their ability to negate free radicals and peroxide radicals so that they effectively inhibit lipid oxidation (Kawiji et al., 2011). This is reinforced by the results of previous studies on quantitative tests of the phytochemical content of antimicrobial compounds of traditional scrubs without extracts with traditional scrubs combined with soursop leaf extracts showing an increase in quantitative content such as flavonoids compounds 534.56 mg/100gr to 2761.86 mg/100gr, tannin compounds 0.110% to 1.98%, hydroquinone compounds 0.00% to 5.68% and phenol compounds 7.29 mg/100gr to 355.42 mg/100gr (Sudarmanto et al., 2023).

CONCLUSION

The average total bacteria count before and after using soursop leaf extract scrub products was 13.5 CFU/cm² and 2.7 CFU/cm². The soursop leaf extract scrub effectively reduces the total bacteria count before and after using soursop leaf extract scrub products. Researchers need to conduct antibacterial tests for scrubs without soursop leaf extract as a comparison, as well as conduct further tests such as safety tests, expiration periods and aesthetic tests on soursop leaf extract scrub products and the public is expected to utilise soursop leaf extract scrubs as a preventive measure against skin infections caused by germs.

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