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FORMULASI DAN UJI AKTIVITAS DEODORANT STICK EKSTRAK ETANOL DAUN SIRIH MERAH (*Piper ornantum* N.E.BR) TERHADAP BAKTERI *staphylococcus epidermidis*

FORMULATION AND ACTIVITY TEST DEODORANT STICK ETHANOL EXTRACT RED BETEL LEAF (*Piper ornantum* N.E.BR) AGAINST *staphylococcus epidermidis* BACTERIA

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Abstract

Red betel leaf (Piper ornatum N.E.Br) is one of several plants that have antibacterial properties so that it can be selected as an active ingredient in deodorants because of its effectiveness as an antibacterial. Red betel leaf contains secondary metabolites, namely alkaloids, flavonoids, tannins and essential oils. The purpose of this study was to determine the formulation of ethanol extract of red betel leaf (Piper ornatum N.E.Br) made in the form of a deodorant stick preparation with good characteristics and to determine the concentration of the deodorant stick preparation in inhibiting Staphylococcus epidermidis bacteria. The study was conducted experimentally including the manufacture of extracts by the maceration method. In this study, ethanol extract of red betel leaf with concentration variations of 1, 2 and 3%. The preparation was tested for organoleptic, homogeneity, pH, melting time, melting point, and antibacterial activity. The content of the phytochemical screening results of the ethanol extract of red betel leaf showed that there were flavonoids, alkaloids, tannins, saponins, and triterpenoids so that they have the potential to inhibit bacteria. The resulting deodorant stick meets the requirements of pH test, melting time test, melting point test and has bacterial inhibitory activity. At a concentration of 1% it is categorized as moderate with an inhibition zone of 6-10 while for a concentration of 2% and 3% it is categorized as strong with an inhibition zone of 10-20 mm.

Keywords: *Red Betel Leaf (Piper ornatum N.E.Br), Deodorant stick, Staphylococcus epidermidis*

Introduction

The skin is an elastic sheath that protects the body from environmental influences. The skin is also the largest organ on the human body, lining the muscles and internal organs. On the skin an endless tangle of networks of blood vessels, nerves and glands, all of which have the potential to develop diseases. The skin protects the body from trauma, a bulwark against bacteria, viruses and fungi (Rani, Pulungan, et al., 2023). Sweat in the human body is produced by sweat glands called apocrine and eccrine glands. Eccrine glands are found on almost all skin surfaces. While the apocrine glands are located in the breast, armpit, and anal and pubic areas (Candra, 2017).

Excessive sweat production leads to body odor. As a result, due to the damp condition of the body, it causes the appearance of bacteria in certain parts of the body.

Some bacteria such as Staphylococcus epidermidis, Staphylococcus aureus, Pseudomonasaeruginosa, Corynabacteri acne and Streptococcus pyrogenes (Indriaty et al., 2022). Deodorant is the answer to these needs, because it can prevent and eliminate body odor by inhibiting the decomposition or decomposition of sweat by bacteria (Dwinita Saefafuna et al., 2019). Deodorant is a cosmetic preparation used to absorb sweat, cover body odor and reduce body odor (Oktaviana et al., 2019). The dosage form of deodorant can be powder, liquid or lotion, cream, stick, spray or aerosol (Tafonao, 2019).

Red betel leaf (Piper ornatum N.E.Br) is one of several plants that has properties as an antibacterial so that it can be chosen as the active ingredient of deodorant because of its effectiveness as an antibacterial and at the same time overcome body odor (Umami, 2019). Red betel has been studied by Rachmawati Sutji (2011), Kusuma et al (2017), Nisa et, al (2014) has alkaloid metabolites, flavonoids, tannins and essential oils with antioxidant and antibacterial activity. Polyphenols contained in red betel are also antibacterial because they can inhibit enzyme activity in bacteria and inactivate proteins on the cell surface (Januarti et al., 2019).

Based on research (Juliantina et al., 2009) has proven that ethanol extract of red betel leaf contains substances that are antibacterial and have inhibitory power against the growth of gram-positive and gram-negative bacteria . Ethanol extract of red betel leaves has inhibitory power against the growth of Staphylococcus epidermidis bacteria, ethanol extract of red betel has inhibitory power at concentrations of 20%, 40%, 60%, and 80% (Kusuma et al., 2016).

Based on the description above, encouraging researchers to conduct research on the formulation and activity test of Deodorant Stick preparation from ethanol extract of Red betel leaf (*Piper crocatum* N.E.Br) against Staphylococcus epidermidis bacteria.

Research Methods

Tools and materials

The tools used in this study are Hot plate (Thermo), rotary evaporator, analytical scales (Mettler Toledo), waterbath (WTB), measuring cup (pyrex), beaker glass (Pyrex), Erlenmeyer (Iwwaki), LAF, porcelain cup (Pyrex), stirring rod (Iwwaki), dropper (Iwwaki), pH meter (Hanna), mortar and pestle (Onemed), OSE wire (Pyrex)., autoclave (GEA),

The material used in this study is red betel leaf (*Piper ornatum* N.E.Br), aluminum foil, red betel extract, cera alba, stearic acid, VCO, cethyl alcohol, propylenglycol, Propyl paraben, oleum rosae.

Formulation Of Deodorant Stick

The formulation of

Making deodorant stick

Making deodorant stick by melting cera alba, and Cethyl alcohol on the waterbath until dissolved, then added propilenglikol and propyl paraben stirred until homogeneous (mixture 1). Next dissolve stearic acid is heated on a hot plate and then stirred until dissolved (mixture 2). The mixture 2 is then inserted into the mixture 1 stir until homogeneous, then VCO is added to the mixture, stir until everything is homogeneous. Then add oleum rosae and stir until homogeneous, and finally added with red betel leaf extract, then poured into a mold allowed to stand until solidified and stored at a temperature of 25°C (Nigrum, 2019).

Physical Quality Inspection Of Preparations

Organoleptic

Testing preparations using the senses to describe the shape or consistency includes shape, color,aroma and texture (Fitri et al., 2022).

Homogeneity

Test Homogeneity test is done by looking at the preparation visually whether the deodorant stick preparation still contains coarse particles or not, if not then it is said to be homogeneous (Robiatun et al., 2022).

pH test

The pH meter is calibrated first by using a standard neutral buffer solution (pH 7.01) and an acidic pH buffer solution (4.01) until the tool shows the pH price. Then the elekroda is washed with distilled water, and then dried with a tissue. Weighed 1 gram of sedation and dissolved in 100 mL of aquadest. Then the electrode is dipped in the solution to show the price of pH to a constant (Ridwanto et al., 2024).

Melt Time Test

Weighed 5 grams of deodorant stick, placed on a beaker filled with water, then recorded the time until the deodorant melts (Saefauna Y, 2017). Melting Point

TestDitimbang 5 gram deodorant stick dimasukan ke dalam beaker glass dan dipanaskan di atas waterbath suhu perlahan-lahan dinaikkan, kemudian diamati pada suhu berapa deodorant melebur (Riani et al., 2024).

Antibacterial test

Testing of the preparation of deodorant stick ethanol extract of red betel leaf is by using the pitting method. 1 ml of *Staphylococcus epidermidis* bacterial until it solidifies. Wells are made using the tip of a sterile pipette, then taken deodorant preparations with concentrations of F 1%, F2 2%,F3 3%, deodorant positive control sold in the market (Pixy) and negative control F0 blanks are then inserted into the wells that have been made, then the petri dish is incubated for 24 hours and the inhibition zone is calculated using a caliper, performed 3 repetitions (Rani, Nasution, et al., 2023).

Results and discussion

Making deodorant stick using the melting method because there is a solid material that must be melted to be able to mix with other materials, besides the melting method also facilitates the printing process.

Organoleptic Test

Organoleptic test results deodorant stick red betel leaf extract (*Piper ornatum* N.E.Br) can be seen in Table 1.

Table 1. Organoleptic test results deodorant stick red betel leaf extract

Formula	Color	Odor	Form	Texture
F1	Light Green	Special Estrak	Solid	Soft
F2	Slightly Dark Green	Special Estrak	Solid	Soft
F3	Dark green	Special Estrak	Solid	Soft
F4 (+)	Orange	Menthol smell	Solid	Soft
F0 (-)	White	The smell of rose	Solid	Soft

Based on Table 1, organoleptic observation of the preparation at all concentrations gives results in the form of a solid form in all formulas, and has a soft texture in all formulas white color, the base deodorant light green on F1, slightly dark green on F2, dark green on F3, and F4 orange color in deodorant preparations on the market. On the base deodorant (blank) smelling of roses, on F1, F2, and F3 has a characteristic odor (the characteristic smell of extract), while on F4 has a menthol odor.

Homogeneity Test

The results of homogeneity observations made on deodorant stick preparations on deodorant bases F0 (-), F1, F2, F3, and F4 (+) are homogeneous, because there are no coarse particles and soft textured preparations so it can be ascertained that the ingredients have been mixed evenly (homogeneous).

pH test

The results of PH deodorant stick examination showed that the pH in the four red betel leaf extract formul (*Piper ornatum* N.E.Br) can be seen in Table 2. pH test results deodorant stick red betel leaf extract (*Piper ornatum* N.E.Br)

Table 2. pH deodorant stick red betel leaf extract

No	Formula	pH
1	F1	5,7
2	F2	5,4
3	F3	5,4
4	F4 (+)	-
5	F0 (-)	5,8

Based on Table 2, the results of the pH examination of deodorant stick showed that the pH in the four formulas varies because the concentration of 1%, 2% concentration, 3% concentration, and also on the blank pH of the resulting preparation still meets the physiological pH limit of the underarm skin. According to the literature cosmetic pH is tried to be the same and as close as possible to the physiological pH of the underarm skin,which is 4.0-6.8 (Kaban et al., 2022).

Melting time Test

Test results melting time deodorant stick red betel leaf extract (Piper ornatum N.E.Br) can be seen in Table 3. Test results melting time deodorant stick red betel leaf extract (*Piper ornatum* N.E.Br).

Table 3. Melting time deodorant stick red betel leaf extract

No	Formula	Melting time
1	F1	21 Menit
2	F2	22 Menit
3	F3	23 Menit
4	F4 (+)	-
5	F0 (-)	21 Menit

Based on Table 3, the test results on the melting time of deodorant stick preparation showed that the melting time of the four formulas varies with each concentration. At a concentration of 1% yield melting time obtained 21 minutes, 2% yield concentration melting time of 22 minutes, at a concentration of 3% yield melting time was 23 minutes, and on the blank yield melting time obtained 21 minutes. The number of minutes obtained indicates the time the preparation can melt at body temperature.

Melting point test Melting point test results deodorant stick red betel leaf extract (*Piper ornatum* N.E.Br) can be seen in Table 4. Melting point test results deodorant stick red betel leaf extract (*Piper ornatum* N.E.Br).

Table 4. Melting point test results deodorant stick red betel leaf extract

No	Formula	Melting point
1	F1	65 ℃
2	F2	65℃
3	F3	65℃
4	F4 (+)	-
5	F0 (-)	60℃

Based on Table 4, Melting point test performed to determine the maximum temperature of the deodorant stick was melted. From the test results of the melting point of the preparation, at a concentration of 1% deodorant stick melts at a temperature of 65°C, concentration2% deodorant stick melts at a temperature of 65°C, concentration of 3% deodorant stick melts at a temperature of 65°C, and the blank deodorant stick melts at a temperature of 60°C. This indicates that the preparation will be safely stored at room temperature and will not melt quickly at temperatures above 50°C so that deodorant is more resistant to solar heat during storagep.

Antibacterial test

Test results antibacterial deodorant stick red betel leaf extract (*Piper ornatum* N.E.Br) can be seen in Table 5. Test results antibacterial deodorant stick red betel leaf extract (*Piper ornatum* N.E.Br).

Table 5. Antibacterial deodorant stick red betel leaf extract

Formula	Inhibition Zone (mm)			Average (mm)	Information
F1 (1%)	9,5	9,9	10,3	9,9	Moderate inhibition zone
F2 (2%)	8,8	11,9	15,5	12,06	Strong inhibition zone
F3 (3%)	11,7	15,7	19,6	15,66	Strong inhibition zone
F4 (+)	14,7	19,1	20,0	17,96	Strong inhibition zone
F0 (-)	0	0	0	0	No barrier zone

Based on Table 5, the results obtained from formula 1 concentration of 1% obtained inhibition zone at 3 repetitions of 9.5 mm, 9.9 mm, and 10.3 mm obtained an average of 9.9 mm. In formula 2 the concentration of 2% obtained results are 8.8 mm, 11.9 mm, 15.5 mm with an average of 12.06 mm. In formula 3 the concentration of 3% obtained results of 14.7 mm, 19.1 mm and 20.0 mm with an average of 17.96 mm.

The inhibition zone table, it can be seen that the deodorant stick ethanol extract of red betel leaf for F1 1% is categorized as medium with an inhibition zone of 6-10 while F2 2% and F3 3% are categorized as strong with an inhibition zone of 10-20 mm. So it can be concluded that the preparation of deodorant stick ethanol extract of red betel leaf has a moderate and strong inhibition against *Staphylococcus epidermidis* bacteria.

Deodorant stick ethanol extract of red betel leaf shows that the greater the concentration used the higher the antibacterial inhibition. This is due to the presence of secondary metabolites in the extract that greatly affect the concentration to be used in the preparation. The active metabolites of ethanol extract of red betel leaf that serves as an antibacterial are flavonoids, tannins and terpenoids (Reveny 2011).

Conclusion

Based on the results of research that has been done, it can be concluded that the secondary metabolite compounds obtained are alkaloids, flavonoids, saponins, tannins, and triterpenoids Deodorant Stick preparation ethanol extract of red betel leaf (*Piper*

ornatum N.E.Br) has antibacterial activity which is indicated by the value of inhibition against Staphylococcus epidermidis bacteria.

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