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TESTING THE SENSITIVITY OF STREPTOCOCCUS MUTANS TO PATCHOULI LEAVES (POGOSTEMON CABLIN BENTH)

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ABSTRACT

Dental caries is a common oral health problem; Streptococcus mutans is a Gram-positive coccus bacterium that is the primary cause of dental caries. The use of natural substances as alternative treatments for dental caries has been the subject of increasing research, including patchouli leaves (Pogostemon cablin Benth.), which are known to contain active compounds such as flavonoids, tannins, and saponins that possess antibacterial properties. This study aimed to determine the sensitivity of Streptococcus mutans to patchouli leaf extract. The study was conducted experimentally at the Microbiology Laboratory of the Aceh Ministry of Health Polytechnic (Poltekkes Kemenkes Aceh) using the disk diffusion method. Patchouli leaf extract was observed through maceration using 96% ethanol as the solvent. The results showed that patchouli leaf extract at a 100% concentration produced an inhibition zone of 19 mm, which is classified as sensitive. For comparison, the positive control (erythromycin) showed an inhibition zone of ≥ 18 mm, while the negative control (0.85% NaCl) produced no inhibition zone. Based on these results, it can be concluded that patchouli leaf extract has antibacterial potential against Streptococcus mutans and can therefore be used as an antibacterial herbal agent.

Keywords: *Streptococcus mutans*, dental caries, patchouli leaves, antibacterial, sensitivity test

INTRODUCTION

Dental caries is the medical term for cavities, namely damage to the hard tissue of the teeth (email and dentin) which occurs due to erosion by acids produced by bacteria. Bacteria that can cause dental caries are known as cariogenic bacteria. *Streptococcus mutans* is one of the main bacteria that contributes to the development of dental caries (Busman *et al*., 2021).

Streptococcus mutans attached to the surface of the teeth, these bacteria are an important factor in the etiology of dental caries. These bacteria produce acid, which is a consequence of sucrose metabolism. The oral cavity becomes acidic due to this disorder. After 6–24 months of exposure, acid *Streptococcus mutans* erode tooth surfaces and resulting cavities

(Syaflida, *et al*., 2023).

The amount of plaque that forms on the surface of the teeth can be overcome by preventing it from forming or by cleaning it thoroughly. Chemical or mechanical methods can be used to remove plaque (Apriandi, *et al*., 2020).

Mechanically by brushing and flossing between teeth, or chemically by using antibacterial agents made from plants or chemicals. One way to remove plaque chemically is to gargle using mouthwash (Sholekha *et al*., 2022).

Antibacterials are substances that stop the growth of harmful bacteria. To stop the spread of disease and infection, eradicate microorganisms in diseased host cells, and prevent microorganisms from breaking down material, it is important to control germ proliferation (Rambe *et al.*, 2022).

Ability to reduce harmful plaque and germs, Chlorhexidine gluconate (CHX) mouthwash is often used as an antibacterial. Considering that the use of CHX can negatively impact on healthy tissue and increasing the risk of hypersensitivity, it is important to create new agents made from herbal plants that utilize the antibacterial properties of their biologically active elements (Jefrey *et al*., 2022).

According to Restina (2016), previous research used natural compounds yang considered useful deep treating various disease with effect

relatively fewer sides than synthetic drugs in an effort to reduce the number of germs *Streptococcus mutans*. Patchouli plants are a natural substance that has antibacterial properties.

Essential oils, flavonoids, saponins, tannins, terpenoids, and steroids are all present deep patchouli leaves (*Pogostemon cablin Benth*). Alcohols with antibacterial properties include patchouli alcohols and their derivatives, phenols,

and terpenoids present in patchouli oil. The leaves of this plant, among other parts, can be used to treat diarrhea and headaches. Essential oils, saponins, phenols, flavonoids, terpenoids, and steroids are some of the active ingredients in patchouli leaf extract that have the ability to stop the growth of germs (Sernita, 2021).

This research aims to find out how to test bacterial sensitivity *Streptococcus mutans* against patchouli leaves (*Pogostemon cablin Benth)* sensitive to Bacteria *Streptococcus*

METHODS

The research method used is the experimental method, namely trial methods or observations carried out to recognize cause and effect relationships between symptoms (Zuhra, 2019). This research was carried out by conducting trials patchouli leaf extract to inhibit bacterial growth *Streptococcus mutans* on MHA media (*Muller Hinton Agar*). The sampling location at Simpang Layang, Timang Gajah District, Bener Meriah Regency and the research was carried out at the Microbiology Laboratory, TLM Poltekkes Department, Ministry of Health Aceh, Jalan Tgk. H. Mohd. David Beureueh No. 168 A, Banda Aceh. Research has implemented at 27 – 30 April 2025. Population on research this is Leaf patchouli (*Pogostemon cablin Benth*).

The sample studied was Leaves 50 grams of patchouli were extracted and the inspection material was *Streptococcus mutans*. The sensitivity test examination was carried out using the Kirby-Bauer method or disc method, namely by soaking a disk made of filter paper with 100 % patchouli leaf extract, then placing it on the surface of MHA media which had been smeared with bacterial suspense *Streptococcus mutans*. For positive control, Erytromicin antibiotics were used and negative control used 0.85 % NaCl solution. After incubating the treatment medium for 1x24 hours with temperature 37°C, so an assessment was carried out to see the obstacle zone.

RESULTS

After research, the Bacterial Sensitivity Test is carried out *Streptococcus mutans* against patchouli leaves (*Pogostemon cablin Benth*) then the results can be seen in the table below.

Table 1 Mean values of Bacterial Growth inhibitory zones *Streptococcus mutans*

against patchouli Leaf Extract (*Pogostemon cablin Benth*).

NO	Samples	Zone Obstacle (mm)		Average Obstacle zone	Description
		P1	P2		
1	Leaf patchouli 100% concentration	19 m m	20 mm	19 mm	Sensitive
2	*Erythromycin* Control(+)	22 m m		1 8 m m	Sensitive
3	NaCl Control (-)	0		0	Resistant

Description :

P1 : Repetition 1

P2 : Repetition 2

Table 1 show that the results of the test *Streptococcus mutans* against patchouli leaves (*Pogostemon cablin beth*) sensitive on concentration 100 % with zone inhibit 19

mm. while control positive zone against *Erythromycin* is ≥ 18 mm, and negative control NaCl 0.85 % does not form a zone inhibit.

DISCUSSION

Based on research results shows the diameter of the zone bacterial growth *Streptococcus mutans* sensitive to leaf extract patchouli (*Pogostemon cablin Benth*) concentration 100 %. This shows that the antibacterial content contained in the active content in the extract patchouli leaves are able to damage bacterial membranes, with inhibits enzymes in bacteria. The antibacterial substances found in patchouli leaves are essential oils, saponins, flavonoids, Tannins, Glycosides, Terpenoids, and Steroids.

Oil atsiri have ability for inhibits the growth of various pathogens due to the presence of natural compounds produced by organ plant. Chemical content main oil atsiri origanum (carvacrol and thymol) proven different in origin proposal and trait antimicrobial (Swamy, dkk, 2016). The active

ingredients in steroids also have antibacterial properties, the chemical components of steroids can also have antibacterial effects. Lipid membranes and sensitivity to steroid components are related to how they work, resulting in liposome leakage, decreased membrane integrity, and changes in cell membrane architecture, ultimately leading to cell fragility and lysis (Junaedi, 2023).

According to Viando (2023), tannins inhibit bacterial formation by inhibiting the enzyme reverse transcriptase and DNA topoisomerase. According to Junaedi (2023), tannins have antibacterial properties by interfering with cell wall production, resulting in distorted cell shape and, ultimately, bacterial cell lysis and death (Junaedi, 2023).

n test sensitivity, this study uses the Kirby-Bauer method. The sensitivity of microorganisms to antibiotics is confirmed by antibiotic sensitivity tests. Purpose test sensitivity this is for ensure how much good an antibiotic kills bacteria (Khusuma, 2019).

Effective against microorganisms that cause oral infections, the antibiotic erythromycin is used as a positive control. For sufferers who are allergic to penicillin, erythromycin is a recommended antibiotic for oral infections.

CONCLUSION

Based on the research results, it can be concluded that bacteria *Streptococcus mutans* sensitive against patchouli leaf extract (*Pogostemon cablin Benth*) at a concentration of 100 %. So it can be suggested that further research needs to be carried out to use other plant alternatives that have active compounds such as essential oils, saponins, Tannin, Flavonoids, Glycosides, Terpenoids, and Steroids, against bacterial sensitivity *Streptococcus mutans* and further research needs to be carried out on the Sensitivity Test *Streptococcus mutans* against patchouli leaves (*Pogostemon cablin Benth*). by using different concentrations

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