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RESEARCH ARTICLE

Antimicrobial Activity Test of Ginseng bugis (*Talinum paniculatum* Gaertn.) Leaves Ethanol Extract against *Pseudomonas aeruginosa*, *Propionibacterium Acnes*, *Streptococcus Mutans* and *Candida Albicans*

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Abstract

Ginseng bugis (*Talinum paniculatum* Gaertn.) leaf is traditionally used in the treatment of diarrhea, ulcers, wounds and skin infections by the people of South Sulawesi province. The leaves contain chemical compounds such as saponins, alkaloids, tannins, flavonoids and triterpenes which can be a source of antioxidants and bactericidal. This study aims to determine the antimicrobial activity of ginseng bugis leaf extract against the microbes. The test microbes used were *Pseudomonas aeruginosa*, *Propionibacterium acnes*, *Streptococcus mutans*, and *Candida albicans* which has been matured. The antimicrobial activity test used agar well diffusion method with ginseng bugis leaf extract solution with a concentration variation of 0.1%; 0.5%; 1%; 2%; 4%; 8%; 16%; and 32%. The inhibition zone observations were carried out on bacteria incubated at 37°C for 24 hours and fungi incubated at 25°C for 72 hours. The results of the inhibition zone measurement showed that the higher the concentration of the test solution for the ethanol extract of ginseng bugis leaves, the greater the inhibition zone given. Based on the results, the ethanol extract of ginseng bugis leaves had antimicrobial activity at the minimum inhibitory concentration of 1% against *Pseudomonas aeruginosa*, *Propionibacterium acnes*, *Candida albicans* and a minimum inhibitory concentration of 4% against *Streptococcus mutans*.

Keywords: Antimicrobial, Ethanol Extract, *Talinum paniculatum* Gaertn.

Introduction

The multitude of infectious diseases is the basis for finding sources of natural medicines that are inexpensive and have the potential for antimicrobial activity [1]. Indonesians are used to using traditional medicines which are generally derived from plants to prevent or treat some diseases.

One of the plants that have been constantly used as a traditional medicine is a ginseng leaf which has the regional name of ginseng bugis. Ginseng bugis leaves (*Talinum paniculatum* Gaertn) is traditionally used in the treatment of diarrhea, dysmenorrhea, lung disease, spleen disorders, impotence, ulcers, wounds, stimulants and skin infections. Ginseng bugis leaves contain saponin derivative compounds, alkaloids,

tannins, flavonoids and triterpenes which can be a source of antioxidants, reduce swelling (anti-tumor), bactericidal, antiviral and anti-histamine [2-6]. Fungal infections are caused by an unhealthy lifestyle. Indonesia has a tropical climate with high rainfall and humidity, which provide the ideal environment for the development of fungi [7].

One of the causes of yeast infection is candidiasis which is about 70% caused by the *Candida albicans* species. *Candida* is a normal flora in the human body that is opportunistic and will infect if the immune system and flora balance are disturbed [8]. Bacteria are one of the causes of infection both sporadically and

endemically, such as *Staphylococcus aureus*, *Escherichia coli*, and *Pseudomonas aeruginosa*. *Staphylococcus aureus* can cause infection of the hair follicles and sweat glands, ulcers, as well as infection in wounds. The bacteria have low invasion capability, are involved in many skin infections [9]. *Escherichia coli* is included in gram-negative bacteria belonging to the *Enterobacteriaceae* family. *Escherichia coli* bacterial infection in humans can cause bloody or non-bloody diarrhea [10].

Propionibacterium acnes is a gram-positive bacterium and is a normal flora on the skin that plays a role in the formation of acne [11]. *Pseudomonas aeruginosa* is a human pathogenic bacterium that can enter areas with an abnormal defense system. The bacteria can cause respiratory tract infections [12]. *Streptococcus mutans* is associated with oral cancer. The bacteria play an important role in the formation of dental caries because they can colonize the acidity of the tooth surface [13].

Materials and Methods

Materials

The materials used are ginseng bugis (*Talinum paniculatum* Gaertn) from South Sulawesi province of Indonesia and some bacteria: *Pseudomonas aeruginosa*, *Propionibacterium acnes*, *Streptococcus mutans* and *Candida albicans*. The bacteria are obtained from Laboratory of Microbiology of Faculty of Pharmacy, Universitas Muslim Indonesia.

Methods

Extract Production

The ginseng bugis (*Talinum paniculatum* Gaertn) leaf ethanol extract was made through maceration method using ethanol solvent. After soaking for 3 days, it is then filtered. After which re-maceration was carried out. Then, the filtering process was done. The filtrate obtained was evaporated using a rotary evaporator to obtain a thick extract from the ginseng bugis leaves [3, 14].

Antimicrobial activity testing

A antibacterial activity test of the ginseng bugis leaf ethanol extract against

Pseudomonas aeruginosa, *Propionibacterium acnes*, *Streptococcus mutans* and *Candida albicans* was performed using the agar well diffusion method. NA Medium for *Pseudomonas aeruginosa*, *Propionibacterium acnes*, *Streptococcus mutans* bacteria dan PDA medium for *Candida albicans* as much as 5 mL was poured into a petri dish and allowed to solidify as a base layer. After it has solidified, the girders are planted on the surface of the base layer by adjusting the distance so that the observation area does not rest.

Then, 1 ose of the test microbial suspension was taken inoculated into each medium which was still liquid as much as 7 mL and homogenized. Furthermore, poured into a petri dish as a second layer then waiting to solidify. Subsequently, the anchors are lifted using tweezers so that wells are formed which will be used in the bacterial test.

The extract was made into a solution with a concentration variation of 0.1%; 0.5%; 1%; 2%; 4%; 8%; 16%; and 32% using DMSO solution as the sample solvent. The extract test solution was put into prepared wells of 100 μ L using a micropipette. Then incubated for 24 hours at a temperature of 37°C for bacteria and 72 hours at a temperature of 25°C for fungi. Microbial growth was observed and clear zones formed around the wells were measured by using a caliper [4, 15].

Results and Discussion

The leaves of ginseng bugis (*Talinum paniculatum* Gaertn) were traditionally used in the treatment of diarrhea, dysmenorrhea, lung disease, spleen disorders, impotence, ulcers, wounds and skin infections. Ginseng bugis leaves contain saponin derivatives, alkaloids, tannins, flavonoids and triterpenes.

The use of the plant as an antimicrobial can be identified by testing the antimicrobial activity of the ginseng bugis leaf extract through the observation of the inhibition zone in the test microbes. The test microbes used were *Pseudomonas aeruginosa*, *Propionibacterium acnes*, *Streptococcus mutans* and *Candida albicans*. The concentrations used varied in order to determine the effect of the concentration on the antimicrobial activity of bugis

ginseng leaf extract in inhibiting the growth of the tested microbes. The results of inhibition zone measurements and observations of the antimicrobial activity

of the ethanol extract in the ginseng bugis leaf against *Pseudomonas aeruginosa*, *Propionibacterium acnes*, *Streptococcus mutans* and *Candida albicans* can be seen in Table 1 and Fig. 1.

Table 1: Antimicrobial activity of ginseng bugis (*Talinum panicullatum* Gaertn.) leaves ethanol extract against bacteria

Bacteria	Concentration (%) / Inhibition Zona (mm)							
	0.1	0.5	1	2	4	8	16	32
<i>Pseudomonas aeruginosa</i>	0	0	9.7	10.6	13.1	17.5	18.6	20.9
<i>Propionibacterium acnes</i>	0	0	10.71	13.9	15.66	17	21.3	26.9
<i>Streptococcus mutans</i>	0	0	0	0	13.76	18.2	22.75	24.5
<i>Candida albicans</i>	0	0	11.59	13.26	16.6	19	21.8	25.4

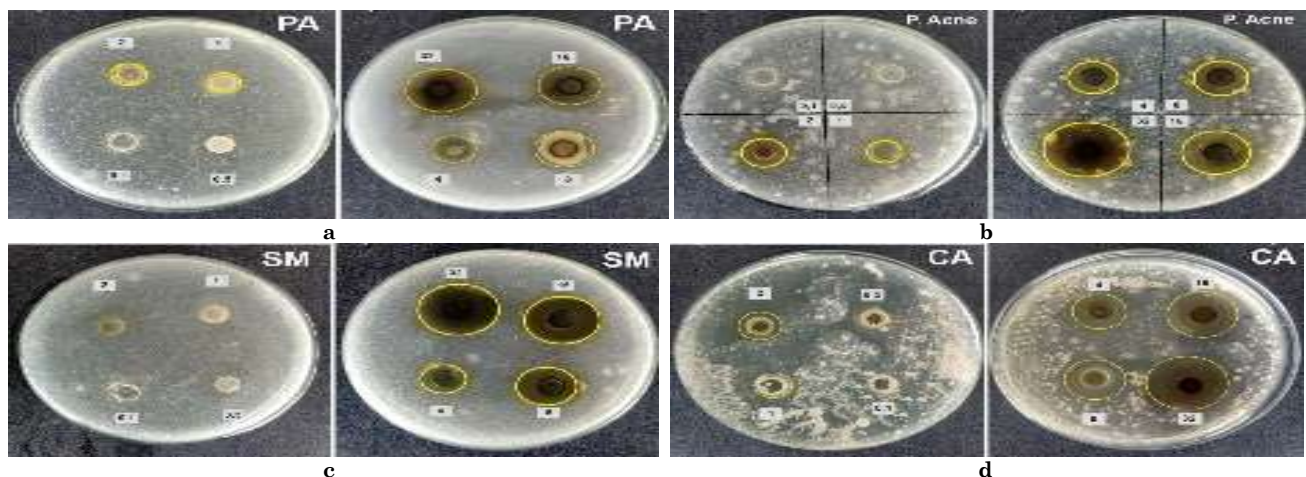


Fig. 1: Antimicrobial activity of ginseng bugis (*Talinum panicullatum* Gaertn.) leaves ethanol extract against bacteria:

a. *Pseudomonas aeruginosa* b. *Propionibacterium acnes* c. *Streptococcus mutans* d. *Candida albicans*.

The results of the measurement of the inhibition zone for the activity of ginseng bugis leaf extract against the test microbes in Table 1 indicate that extract can inhibit the growth of *Pseudomonas aeruginosa* bacteria at a concentration of 1% with a diameter of 9.7 mm. The extract inhibited the growth of *Propionibacterium acnes* and *Candida albicans* fungi at a concentration of 1% with a diameter of 10.71 mm and 11.59 mm respectively. Whereas in *Streptococcus mutans* bacteria, the extract can inhibit at a concentration of 4% of 13.76 mm.

Furthermore, at a concentration of 32% extract against the all tested microbes had the largest inhibition zone of 20.9 mm, 26.9 mm; 24.5 mm and 25.4 mm respectively. Based on the measurement results, it shows that the higher the concentration of the test solution, the greater the resulting inhibition zone. The antibacterial activity of the ginseng bugis leaf extract is thought to be from the chemical components contained

within the plant such as saponins, alkaloids, tannins, flavonoids and triterpenes. Saponin activity acts as antibacterial through the mechanism of disrupting cell membrane permeability or leakage of bacterial cells which causes death due to loss of essential ingredients [16]. Alkaloids serves as antibacterial by interfering with the peptidoglycan preparation of bacterial cells so that the cell wall layer is not formed completely which causes the death of bacteria [17].

Additionally, the activity of tannins as an antibacterial by means of interfering with the permeability of the bacterial cell membrane making the cell wall shrink resulting in the death of bacteria and has antibacterial activity by suppressing protein [18]. Furthermore, flavonoids work by disrupting the integrity of bacterial cell membranes through the formation of complex compounds with bacterial extracellular proteins [19].

1 Conclusion

Based on the research results, it can be concluded that the ethanol extract of ginseng bugis (*Talinum panicullatum* Gaertn.) leaf has shown antimicrobial activity at a minimum inhibitory concentration of 1% against *Pseudomonas aeruginosa*, *Propionibacterium acne*, *Candida albicans* and a minimum inhibitory concentration of 4% against *Streptococcus mutans*.

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