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Antifungal Activity Test Of Belimbing Tanah Leaf Extract (Baccaurea Parviflora) Against The Growth Of Candida Albicans Fungus

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Abstract—Belimbing Tanah (Baccaurea parviflora) is one of the members of the Baccaurea genus that has been utilized by the Indonesian people as a remedy for fungal itching. This is supported by the discovery of secondary metabolite content in some members of the Baccaurea genus which has the potential as an antimicrobial. This study aims to determine the antifungal activity of Belimbing Tanah leaf extract in inhibiting the growth of Candida albicans fungus. In this study, extraction of B. parviflora leaves and determination of antifungal activity using the well diffusion method were carried out. Based on the results of antifungal activity testing, it is known that the extract of Belimbing Tanah leaves cannot inhibit the growth of C. albicans. The results showed that the extract of Belimbing Tanah leaves has no potential as an antifungal.

Keywords—Antifungal; Baccaurea parviflora, well diffusion method

I. INTRODUCTION

In the pharmaceutical industry, more than 80% of commercial drugs have been modified from local knowledge, even drugs for diseases such as cancer are still derived directly from plants (Fabricant and Farnsworth, 2001). Plants that can be used in traditional medicine have several active chemicals that have pharmacological effects. These active compounds usually do not play a role in primary metabolism so they are called secondary metabolites (Liu et al., 1998).

Baccaurea is a genus of flowering plants and includes native Asian plants spread in Southeast Asia, China, India, and the Pacific Ocean (Haegens, 2000), has a tree or shrub habitus, and the fruit tastes sour to sweet (Uji, 1997). Based on the results of research conducted by Gunawan *et al.,* (2016) in Samarinda, East Kalimantan, it is known that some members of the *Baccaurea* genus contain secondary metabolites, namely alkaloids, flavonoids, carotenoids, anthocyanins, tannins, rosmarinic acid and phenolics. The content of secondary metabolites in the *Baccaurea* genus has antioxidant, anti-inflammatory, anti-inflammatory and antimicrobial properties. According to Munawaroh (2020), *B. parviflora* or known by the local name Belimbing Tanah is also a member of the *Baccaurea* genus which has been traditionally used as an ingredient for fungal itching and antitripanosoma drugs.

Candida albicans is one of the pathogenic fungi in humans. The disease caused by the fungus *C. albicans* is known as Candidiasis, which is an acute and subacute fungal disease that can affect the mouth, vagina, skin, nails, lungs and digestive tract. This disease is found throughout the world and can affect all ages, both men and women (Jawetz, 1995). Research on natural antifungals to overcome diseases caused by the fungus *C. albicans* has not been done much. Therefore, seeing the content of bioactive compounds, it is necessary to have information about the study or potential of the type of *B. parviflora* as a natural antifungal.

II. Research Methods

The raw materials used in this study were *B. parviflora* leaf extracts obtained from the Medicinal Plant Garden, Pharmacy, Andalas University, Padang, West Sumatera, Indonesia. The test fungus used is *Candida albicans* which is a pure culture from the

Microbiology Laboratory, Faculty of Medicine, Andalas University, Padang, West Sumatera, Indonesia. The solvent used to extract *B. parviflora* is methanol p.a. The media used for antifungal activity tests are HIB (Heart Infusion Broth) and Sabouraud Dextrose Agar (SDA) media for the growth of *C. albicans* fungi, positive control ketoconazole, negative control DMSO, sterile distilled water and 70% alcohol.

The tools used in this research are tweezers, ose needles, spiritus bunsen, thrust frame, cotton swab, stirring rod, autoclave, erlenmeyer flask, measuring cup, rotary evaporator, incubator, petridish, hot plate, erlenmeyer, measuring cup, test tube, rack, magnetic stirer, vial bottle, vortex, mixer, micropipette, label paper, ruler, electric scale, laminar air flow.

Preliminary research includes extraction, antifungal activity test and negative control test. Extraction was carried out by maceration method, then the solvent was evaporated using a rotary evaporator. The antifungal activity test was carried out using the modified Kirby baeur method, namely the well diffusion method with the *Candida albicans* test fungus. *B. parviflora* leaf extracts with concentrations of 25%, 50%, and 100% were injected into wells that had been formed in a solid medium that had been inoculated with fungi. The stages of the antifungal activity test are as follows: Fungi that have been grown on HIB (Heart Infusion Broth) are then mixed evenly into SDA media, and poured into petridish, each petridish is made 4 wells, each well is filled with extracts according to concentration (25%, 50% and 100%), then the petridish is incubated for 3x24 hours then observe and measure the inhibition zone (clear zone) around the well.

III. Results and Discussion

Based on research that has been conducted on antifungal tests against *Candida albicans* using extracts from the leaves of the *B. parviflora* plant does not show the formation of an inhibition zone against the growth of the fungus. The extract of the leaves of the Belimbing Tanah plant (*B. parviflora*) cannot inhibit the growth of *C. albicans* so that no inhibition zone is formed at all concentrations. The results of the antifungal test are presented in Table 1 and Figure 1.

Table 1. Results of Antifungal Activity Test of *B. parviflora* Leaf Extract against *C. albicans* during 72-hour Incubation (mm)

No	**Treatment**	**Average diameter of inhibition zone (mm))** *B. parviflora* Medicinal Plant Garden
1	Control + (Ketoconazole)	15
2	Control - (DMSO)	0,00
3	Extract Concentration 25%	0,00
4	Extract Concentration 50%	0,00
5	Extract Concentration 100%	0,00

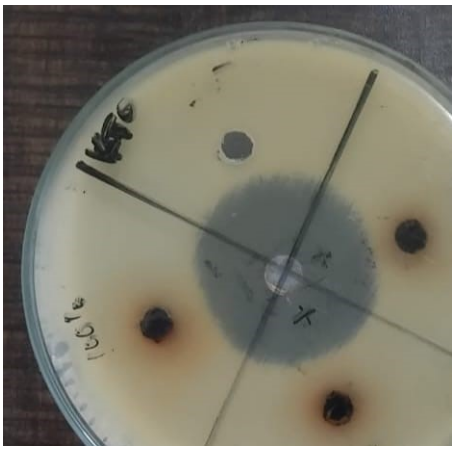

Figure 1. Antifungal Activity Test of Belimbing Tanah Leaf Extract *(B. parviflora*) Medicinal Plant Garden against the growth of *Candida albicans* fungus.

The inhibition zone of the plant leaf extract against the growth of *Candida albicans* is thought to be due to the bioactive compounds in the *B. parviflora* leaf extract not being able to inhibit the synthesis of the cell wall of *C. albicans* so that it has no effect on the growth of the fungus (Lutfiyanti, 2012). The structure of the fungal cell wall is more complex, its thickness is 400 nm and its composition consists of glucan, mannan and chitin (Bagg, 2006) as a result, bioactive compounds from *B. parviflora* are difficult to penetrate the fungal cell wall.

The level of bioactive compounds and the type of compounds contained in the extract can affect the potential of the extract so that this allows the formation of no inhibition zone (Ngamkitidechakul *et al.,* 2010), so that even though this Belimbing Tanah plant has bioactive compounds that act as antifungals, it is suspected that the levels are not sufficient to inhibit fungal growth. Other opinions also state that differences in plant organs and maturity of the plant organs can affect their biological activity (Wang *et al.,* 2003; Duma *et al.,* 2003).

The negative control used is DMSO which does not show the formation of inhibition zone. DMSO solvents include organic solvents and are not bactericidal (Assidqi, Tjahjaningsih and Sigit, 2012). The positive control used was ketoconazole which showed the formation of an inhibition zone against the test fungus of 15 mm.

IV. Conclusion

Bioactive compounds commonly contained in *Baccaurea* species are alkaloids, phenolics and flavonoids. However, in testing the antifungal activity of the leaf extract of the Tanah Belimbing plant (*B. parviflora*) against *C. albicans* does not have potential as a natural antifungal. For further research it is recommended to use other types of solvents and extract methods.

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