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Antibacterial activity of Purified Mangosteen (Garcinia mangostana) Rind Extract

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ABSTRACT:
The bacterial resistance demonstrated by microorganisms in the presence of antimicrobial agents has prompted the search for new materials to address this public health issue.Mangosteen (Garcinia mangostana) extract has high xanthon content thereby potentially antibacterial. This research aimed to examine the effect of purified mangosteen rind extract on inhibiting growth and killing bacteria. The antibacterial activity of purified mangosteenrind extract with concentrations of 32%, 16%, and 8% was tested against S. aureus and P. aeruginosa using the agar diffusion method. Purified mangosteen rind extract at concentrations of 8%, 16%, and 32% showed antibacterial activity against Staphylococcus aureus with an average inhibition zone diameter of 11,3 mm, 15,73 mm, and 16,6 mm, respectively. Purified mangosteen rind extract at concentrations of 8%, 16%, and 32% also showed antibacterial activity against Pseudomonas aeruginosa with an average inhibition zone diameter of 10,35 mm, 11,38 mm, and 12,58 mm, respectively. In conclusion, purified mangosteen rind extract has strong antibacterial activity against Staphylococcus aureus and Pseudomonas aeruginosa.

KEYWORDS: Antibacterial, Mangosteen, Purified Mangosteen, Garcinia mangostana, Diffusion agar method.

I. INTRODUCTION

Antibacterial agents are essentially important in reducing the global burden of infectious diseases. However, as resistant pathogens develop and spread, the effectiveness of the antibiotics is diminished. This type of bacterial resistance to antimicrobial agents poses a very serious threat to public health, and for all kinds of antibiotics, including the major last-resort drugs, the frequencies of resistance are increasing worldwide [1]. Therefore, antimicrobial drug discovery from alternative sources is gradually gaining importance, particularly related to antibacterial drug discovery. Secondary metabolites are a major reservoir of chemical diversity, therefore, they are considered a potential source of new drugs for combating the perils of drug resistance [2]. Previous research has discovered that various plants have a diverse range of pharmacological activities with the potential to treat a variety of diseases. [3]–[8]. One of the native plants in Indonesia which contain a large number of xanthon is mangosteen (Garcinia mangostana)[9].Garcinia mangostanaextract contains xanthon as a major component as well as some other components such as benzophenones, flavonoids, andanthocyanins [10]. The presence of high content of xanthon in Garcinia mangostanamakes it a potential plant to be used in traditional medicine. Previous research has been reportedthat Garcinia mangostana extract has the potential for a wide range of pharmacological activities such as antidibetic[11], antioxidant[12], antimalarial [13], anticancer[14], antiprotozoal[15], anthelmintic, and anti-inflammatory [16]. Therefore, these various bioactivities prove the potential of this plant to be applied in treating many diseases. This study aimed to examine the effect of purified mangosteen rind extract on inhibiting growth and killing bacteria.

II. MATERIALS AND METHOD

Materials

Purified Mangosteen Rind Extractwas obtained from PT. Andalas Sitawa Fitolab, Padang, Indonesia which is equipped with CoA, Nutrien Agar (NA), DMSO (Dimethylsulfoxide) (Merck), chloramphenicol disk 30 µg/disk (Oxoid).

Sample preparation

Purified mangosteen rind extractwas dissolved withDimethylsulfoxide (DMSO), then made dilutions with concentrations of 32%, 16%, and 8%.

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Screening for antibacterial activity

The antibacterial activity from purified mangosteen rind extract was tested against S. aureus and P. aeruginosa using the diffusion agar method. Briefly, sterilized disks with purified mangosteen rind extractwere placed on nutrient agar plates with the test organisms and incubated at 37°C for 24 h. The presence of a clearance zone around the disk ware used as an indicator of antimicrobial bioactivity. Chloramphenicol disc (30 µg) is a positive control, while DMSO is negative. The zone of inhibition was measured in mm. The diameter of the inhibition zone ware used to categorize the strength of antibacterial activity according to Davis and Stout (1971) as follows: Very strong (≥20 mm), strong (10–20 mm), moderate (5–<10 mm), and weak (≤5 mm)[17].

III. RESULTS AND DISCUSSION

Using the agar diffusion method, this study investigates the effectiveness of purified mangosteen rind extract in inhibiting the growth of S. aureus and P. aeruginosa bacteria. The results of those studies are described in Table 1.

In the present study, a purified mangosteen rind extractwith a concentration of 32%, 16%, and 8% was used. The antibacterial activity of the mangosteen extract was verified against Staphylococcus aureus bacteria. At concentrations of 8%, 16%, and 32%, the average diameter of the inhibition zone was 15,73 mm, 16,6 mm, and 18,52 mm, respectively. The concentration of 8%, 16% and 32% are in the strong category. The positive control (chloramphenicol) resulted in an average inhibition zone diameter of 28.68 mm which was included in the very strong category (Figure 1).

Table 1. Antibacterial Activity of Purified Mangosteen Rind Extract

No.	Groups	Diameter of inhibition zone (mm) (Mean ± SD)	
		Staphylococcus aureus	Psudomonas aeruginosa
1	8%	15,73 ± 0,32	10,35 ± 0,42
2	16%	16,6 ± 0,71	11,37 ± 0,46
3	32%	18,52 ± 0.37	12,58 ± 0,74
4	Chloramphenicol (K+)	28,68 ± 0,81	23,03 ± 0,46

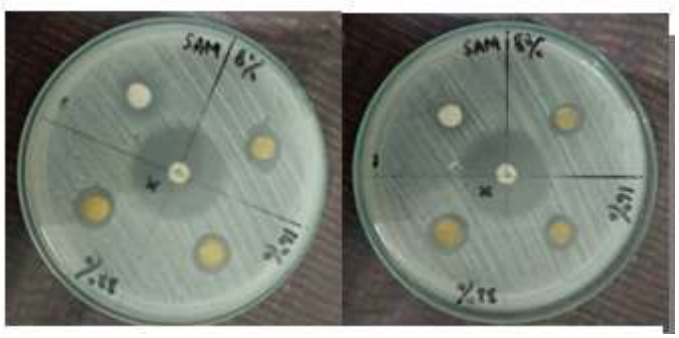

Figure 1. Diameter of the inhibition zone against Staphylococcus aureus

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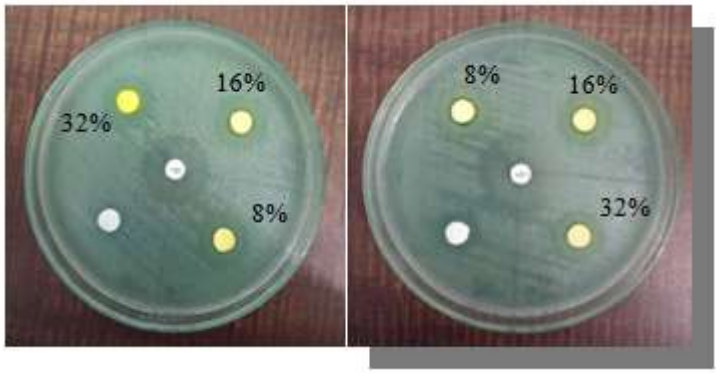

Figure 2. Diameter of the inhibition zone against Psudomonas aeruginosa

The antibacterial activity of the purified mangosteen rind extractwas verified against Psudomonas aeruginosa bacteria. At concentrations of 8%, 16%, and 32%, the average diameter of the inhibition zone was mm, 10,35mm, and 11,38 mm, and 12,58mm, respectively. The concentration of 8%, 16%, and 32% are included in the strong category. The positive control (chloramphenicol) resulted in an average inhibition zone diameter of 23,03mm which was included in the very strong category (Figure2).

The findings of this study are supported by several previous studies that demonstrated mangosteen rind extractability to fight a variety of bacteria, including: a study by sultan et al 2022 suggested that both α-mangostin and commercial antibiotics showed similar antimicrobial effects in the inhibition of reportedmicroorganisms such as M. tuberculosis, E. faecalis, L. ivanovii, S. aureus, M. smegmatis, S. uberis, V. parahaemolyticus, E. cloacae, E. coli, F. columnare, methicillin-resistant S. aureus, S. mutans, P. gingivalis, S. Typhi, S. sonei, and P. aeruginosa[18].

Cunha et al 2014 reported that the ethanolic extract of mangosteen obtained in the resin, leaf, and fruit showed antimicrobial activity against Staphylococcus aureus and Escherichia coli with a MIC of 0.1 mg/mL[14].Another study found the α-mangostin showed maximum antibacterial activity against the four bacterial strains tested. Most of the derivatives showed better antibacterial activity against Gram-positive bacteria B. subtilis and S. aureus followed by the Gram-negative bacteria P. aeruginosa and E. coli[19]. In addition, previous studies also reported that G. mangostana extract showed promising in vivo antibacterial activity against MRSA in a superficial skin infection model in mice[20]. The current study has shown the promising potential of Garcinia mangostanaespecially the purified mangosteen rind extract as a potential antibacterial drug candidate.

IV. CONCLUSION

Purified mangosteen (Garcinia mangostana) rind extract has strong antibacterial activity against Staphylococcus aureus and Pseudomonas aeruginosa.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest.

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