

**UNIVERSITI TEKNOLOGI MARA**

**ANTIMICROBIAL ACTIVITY OF *Piper betle*  
(BETEL) LEAF EXTRACT AGAINST  
ANTECUBITAL FOSSA BACTERIA**

By

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Thesis submitted in partial fulfilment  
of the requirement for the degree of  
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## AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Undergraduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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## ABSTRACT

Different approaches have been tried to reduce bacterial contamination load at the antecubital fossa and have always being improvised. In several studies reported that there are several contradictories about the effectiveness of commercial antiseptic product in reducing bacterial contamination. There was a study found that during the hand rubbing procedure using hand disinfection with alcohol-based hand rubs, users are exposed to these alcohols not only through dermal contact but also via inhalation. Hence, there are many researches tried to explore the potential of different plant extract to reduce bacterial contamination on skin. A new interest of using plants extracts as antimicrobial and antiseptics product is intensify due to increasing of bacterial resistance towards many antibiotics. An evergreen and perennial creeper, with glossy heart-shaped leaves botanically called as *Piper betle*, is a member of the *Piperaceae* family. *Piper betle* is a medically important herb which one of the most promising commercial botanicals reported to possess a lot of therapeutic values such as antimicrobial properties. The present study aim is to determine the antimicrobial activity of *Piper betle* leaf extract against skin bacteria especially on the antecubital fossa area, for evaluation of its potential uses as alternatives antiseptic product. Common antecubital fossa bacteria which used in this study were *Staphylococcus aureus* (ATCC 25923), *Staphylococcus epidermidis* (ATCC 1228), *Streptococcus pyogenes* (ATCC 25922) and *Pseudomonas aeruginosa* (ATCC 10145). The betel ethanolic extract against selected test organisms are were measured using disc diffusion technique. The largest zone of inhibition was produced by *Staphylococcus epidermidis* ( $27.33 \pm 0.882$ ), followed by *Staphylococcus aureus* ( $16.33 \pm 0.882$ ), *Streptococcus pyogenes* ( $14.67 \pm 0.333$ ) and *Pseudomonas aeruginosa* ( $9.33 \pm 0.882$ ). The extract showed has shown very promising inhibitory activity even in low concentration against the gram-positive bacteria namely *Staphylococcus epidermidis*, *Streptococcus pyogenes* and *Staphylococcus aureus* with minimum inhibitory concentration (MIC) value of 0.976 mg/ml, 3.906 mg/ml and 7.813 mg/ml, respectively. Meanwhile, gram-negative *Pseudomonas aeruginosa* is inhibited at the most concentrated concentration with MIC value of 62.5 mg/ml. From this study we can conclude that *Piper betle* leaf has a very good potential to be used as antimicrobial agent due to the presence of various bioactive compound and as an alternative to the commercial alcohol-based antiseptic. The excellent performance ethanol extract of betel against tested microorganism brought about the suggestion of further steps in the development of the natural antiseptic product.

**Keywords:** *Piper betle*, ethanol extract, antiseptic, antecubital fossa bacteria, antimicrobial activity, phytochemicals