

**UNIVERSITI TEKNOLOGI MARA**

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

By

**SITI NUR BALQIS BINTI SHAMSURI**

Thesis submitted in partial fulfilment  
of the requirement for the degree of  
**Bachelor of Medical Laboratory Technology (Hons.)**

**Faculty of Health Sciences**

July 2019

## 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.

Name of Student : Siti Nur Balqis Binti Shamsuri  
Student I.D. : 2015835124  
Programme : Bachelor of Medical Laboratory Technology (Hons.)  
Faculty : Faculty of Health Sciences  
Project Title : Antimicrobial activity of *Piper betle* (betel) leaf extract against antecubital fossa bacteria

Signature of Student :

Date :

## ACKNOWLEDGEMENT

### *In the name of Allah, The Most Gracious, The Most Merciful*

Alhamdulillah, first and foremost gratefulness to Allah SWT for all His blessing and guidance that giving me this opportunity and strength to complete my final year project and thesis.

First of all, I would like to give my highest appreciation to my supervisor, Mr Mohd Fahmi Bin Mastuki, from Department of Medical Laboratory Technology, Faculty of Health Science, Universiti Teknologi MARA for valuable advices, constant guidance, support, motivation, encouragement, patience, endless time and feedback given throughout during this study been carried out. The outstanding guidance from my supervisor really encourages me to complete this study with flying colours and I am very honoured to perform this project under his supervision.

Next, I would like to give my sincere appreciation to all lecturers and lab staffs of Medical Laboratory Technology Department for their cooperation, assistance and valuable advices during lab works. I am also very grateful towards Department of Medical Laboratory Technology, Faculty of Health Science for providing comfortable facilities to conduct my study.

Besides that, I would like to express my absolute gratitude to my group partner, Nurul Huda Nabilah Binti Halim for her assistance, guidance, ideas and cooperation rendered in making this research study a success. My sincere gratitude also to all my group members of final year project, Nursyafiqah Binti Samad, Mohamad Saifullah Bin Sulaiman, Nur Najihah Binti Mohd Raslam and Khairatul Ayyun Binti Mohd Ramli for their endless supports, cares, suggestions, cooperation and contribution towards my research study to the very end.

From the very bottom of my heart, I would like to give my special thank you to all my colleagues, HS241, batch 2015-2019 for their willingness to help and supports throughout my study. The precious and beautiful memories that have been created together will never fade away.

# TABLE OF CONTENTS

<b>AUTHOR’S DECLARATION</b> .....	<b>II</b>
<b>INTELECTUAL PROPERTIES</b> .....	<b>III</b>
<b>ACKNOWLEDGEMENT</b> .....	<b>VI</b>
<b>TABLE OF CONTENTS</b> .....	<b>VIII</b>
<b>LIST OF FIGURES</b> .....	<b>XV</b>
<b>LIST OF TABLES</b> .....	<b>XVIII</b>
<b>LIST OF ABBREVIATIONS</b> .....	<b>XIX</b>
<b>LIST OF SYMBOLS</b> .....	<b>XXI</b>
<b>LIST OF APPENDICES</b> .....	<b>XXII</b>
<b>ABSTRACT</b> .....	<b>XXIII</b>
<b>ABSTRAK</b> .....	<b>XXIV</b>
<b>CHAPTER 1</b> .....	<b>1</b>
<b>INTRODUCTION</b> .....	<b>1</b>
1.1 Background of study.....	<b>1</b>
1.2 Problem statement.....	<b>3</b>
1.3 Significance of study .....	<b>5</b>
1.4 Objectives of study .....	<b>6</b>
1.4.1 General Objective.....	<b>6</b>
1.4.2 Specific objectives .....	<b>6</b>

## 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