



**ANTIMICROBIAL ACTIVITY OF *Lawsonia inermis* EXTRACTS
AGAINST SKIN PATHOGENS**

By

UMI HAIRUN ANIS BINTI ISMAIL

**Thesis Submitted in Partial Fulfilment of the Requirements for
Bachelor of Medical Laboratory Technology (Hons),
Faculty of Health Sciences, Universiti Teknologi MARA**

2016

ACKNOWLEDGEMENTS

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Alhamdulillah, thank you to Allah SWT the Almighty, He who gave me the blessing, guidance, strength, idea and capability to complete the research and, salawat and salaam to the Beloved Prophet Muhammad SAW.

First and foremost, I would like to express my deepest appreciation to my supervisor, Mr. Zed Zakari Abdul Hamid for his guidance, advice, help, knowledge and encouragement towards the completion of this study. I would like to thanks Madam Azlin Sham Rambely for her useful comments and suggestions for improvement throughout this research. The extent of my gratitude is to the lecturers and staffs of Medical Laboratory Department who are always there to assist and support me in completing the research.

My gratefulness is to the Dean and staffs Faculty of Pharmacy for granting me permission to use the instruments and equipment in the laboratory. To the staffs Faculty of Health Sciences, UiTM and Government of Malaysia for the support in finishing the study.

Last but not least I would like to express my gratitude to my parents, Mr. Ismail bin Hassan and _____, and my family members for the prayer, support and encouragement for me to complete this research.

Finally, I would like to thanks all my beloved friends especially my cliques from Microbiology cluster for the help, comments, suggestions, assistance and supports throughout this research. And to those who have been contributing to the completion of this project directly and indirectly. May Allah bless and reward you with good achievement.

TABLE OF CONTENTS

CONTENT	PAGE
TITLE PAGE	i
DECLARATION.....	ii
INTELLECTUAL PROPERTIES	iii
APPROVAL	vi
ACKNOWLEDGEMENTS.....	vii
TABLE OF CONTENTS.....	viii
LIST OF TABLES	xii
LIST OF FIGURES	xiv
LIST OF SYMBOLS, ABBREVIATIONS OR NOMENCLATURE	xvi
ABSTRACT	xviii
CHAPTER 1: INTRODUCTION	1
1.1. BACKGROUND OF STUDY	1
1.2. PROBLEM STATEMENT	3
1.3. SIGNIFICANT OF STUDY	4
1.4. OBJECTIVES OF STUDY	5
1.4.1. General objective:	5
1.4.2. Specific objectives:	5
1.5. HYPOTHESIS OF STUDY	6
1.5.1. Null hypothesis (H_0).....	6
1.5.2. Alternative hypothesis (H_1).....	6

ABSTRACT

ANTIMICROBIAL ACTIVITY OF *Lawsonia inermis* EXTRACTS AGAINST SKIN PATHOGENS

Resistance antibiotic against microorganism is an emerging issue in health care world nowadays. This creates an urgency for discovery of new antimicrobial agents. The use of medicinal plant as natural source has taken over the research world to overcome the drug resistance infectious diseases. In this present study antimicrobial activity of *Lawsonia inermis* extracts is investigated against bacteria of the skin. Traditional folks of Africa, Asia and Middle East countries ever since have been using this plant in treating skin infections. Four microorganisms including two Gram-positive bacteria (*Staphylococcus aureus* and *Staphylococcus epidermidis*) and two Gram-negative bacteria (*Proteus mirabilis* and *Pseudomonas aeruginosa*) which are the common bacteria found causing infection treated with aqueous and ethanol extracts of *Lawsonia inermis*. Antimicrobial activity of the microorganisms is determined by antimicrobial susceptibility testing (AST) by using disc diffusion method and followed by minimum inhibitory concentration (MIC) using broth microdilution method to know the minimum concentration in which the bacteria can be inhibited by the extract. To confirmed MIC, minimum bactericidal concentration (MBC) is established. MBC is determined at the dilution which 99.9% of the organism is dead. *Lawsonia inermis* extract showed significant antimicrobial activity against both Gram-positive and Gram-negative bacteria. The largest zone of inhibition diameter displayed by *S. epidermidis*, 16.8 mm (± 1.04) in aqueous extract and 23.0 mm (± 1.03) in ethanol extract. The minimum value of MIC and MBC for different bacterial strain range from 15.63 $\mu\text{g/ml}$ to 125 $\mu\text{g/ml}$. in conclusion, the present study proved that *Lawsonia inermis* can be use as alternative from natural sources to replace the existing antimicrobial agents with less side effects towards the consumers.

CHAPTER 1: INTRODUCTION

1.1. BACKGROUND OF STUDY

Nature is one of the blessing given by God that have been providing humans with several needs and benefits throughout the ages. In particular, since decades ago plants have become the sources of traditional medicine by treating several diseases and infections (Cragg & Newman, 2013). Traditional medicines sourcing from plants are gaining popularity and more preferable over synthetic drugs (Dhaouadi et al., 2015). The plants are used in treating several diseases due to their healing properties that are determined by the plants medicinal value. Medicinal value is observed by the content of bioactive compounds and the most prominent of these bioactive compounds are alkaloids, tannin, flavonoid and phenolic compounds (Gyawali & Ibrahim, 2014; Mohamed Sham Shihabudeen, Hansi Priscilla, & Thirumurugan, 2010). On the other hand, the increased global interest in the study of various medicinal plants is due to their antibacterial and antioxidant activities, low toxicity and the potential to be a more affordable source of antimicrobial agents compared to costly synthetic drugs (Chew, Jessica, & Sasidharan, 2012).

Lawsonia inermis is a flowering plant of the only species of Lawsonia genus from the family Lythraceae. This plant which popularly known as henna (English) or *Mehndi* (India) or *inai* (Malay) is used as traditional medicine by the folks in Africa, Asia and Middle East countries. Henna is a common plant that used in contact to human skin due to its graceful colour properties. It is broadly used in various religious, ritualistic and wedding ceremonies of Hindu and Muslim communities in South Asian countries such as India, Pakistan, Iran and United Arab Emirates (UAE). Displaying ladylikeness and in differentiating their hands from men, women applied henna as dye for parts of the body such as skin,