

UNIVERSITI TEKNOLOGI MARA

**A SYSTEMATIC REVIEW ON THE ANTI-
MYCOBACTERIAL ACTIVITIES OF
ESSENTIAL OILS**

NUR FEAZIRA BINTI ABDUL KADIR

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TABLE OF CONTENTS

APPROVAL SHEET	i
ACKNOWLEDGEMENT	ii
LIST OF TABLES	vi
LIST OF FIGURES	vii
LIST OF ABBREVIATIONS	viii
ABSTRACT	x
CHAPTER 1	1
INTRODUCTION.....	1
1.1 BACKGROUND.....	1
1.2 PROBLEM STATEMENT.....	3
1.3 AIMS.....	3
1.4 RESEARCH QUESTIONS	3
1.5 SIGNIFICANCE OF THE STUDY	4
CHAPTER 2	5
LITERATURE REVIEW.....	5
2.1 ESSENTIAL OILS AND ITS BASIC STRUCTURE	5
2.2 ESSENTIAL OILS AS ANTI-MICROBIAL AGENTS	7
2.3 THE PREPARATION	15
2.3.1 Natural Plants as the Basic Sources.....	15
2.3.2 Phytochemical Screening.....	17
2.3.3 Anti-Mycobacterial Activity Assessment.....	18

ABSTRACT

Tuberculosis is a chronic infectious disease caused by *Mycobacterium* species bacteria. With the emergence of multi-drug resistant (MDR) bacterial strains, this issue has become a major concern for global public health. The scientists are still in search of new anti-tubercular agent that is less likely to get resistant and with less adverse effect. Amongst complementary medicine treatments, essential oil is gaining popularity in our community. Essential oil is the extraction product of natural plants which the anti-infective properties have been proven in many studies. It has shown good inhibitory activities against bacterial strain such as *Escherichia coli* and *Staphylococcus aureus*, but less is known on its anti-tubercular activities. Therefore, this study aims to conduct a systematic review of published literature on the anti-mycobacterial activities of plant essential oils. An extensive literature search on the use of plant essential oils for anti-mycobacterial activities from year 2000 to 2016 was conducted. Available *in vitro* studies published in National Center for Biotechnology Information (NCBI) in English language were reviewed and screened for inclusion. Data were extracted by two independent researchers and evaluated using Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) tool. A total of 129 literature have been identified through the databases, but only 10 studies were included after screening with inclusion criteria. Over 20 plant essential oils have been tested for anti-mycobacterial properties, from various range of families and origin such as *Citrus sinensis*, *Cymbopogon* species and *Hyptis suaveolens*. This systematic review explores the potential of essential oils in preventing drug resistant bacterial strains to encourage further research on the safety and effectiveness of essential oil therapy in the clinical setting.

Keywords: plants; tuberculosis; essential oils; anti-mycobacterial; *Mycobacterium tuberculosis*; plant extract

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

According to the World Health Organization (WHO), the number of people developing active tuberculosis is getting higher year by year (Zanetti et al., 2010). It is ranked as the major cause of death after human immunodeficiency virus (HIV), which is quite a concern for the health care provider around the world (Elhassan et al., 2016). One-third of the world population was estimated to get infected by *Mycobacterium tuberculosis* annually (Nachega et al., 2003), and the worst part of this problem is the increase in multi-drug resistant (MDR) of the bacterial strains (Elhassan et al., 2016).

Multi-drug resistant tuberculosis (MDR-TB) develops when the bacteria, *Mycobacterium tuberculosis* no longer respond to the first line drugs for anti-tuberculosis. The standard drug regimen for six months course containing isoniazid, rifampicin, pyrazinamide and the fourth drug added are important to increase the efficiency to counter the drug-resistant bacterial infection (Mitnick et