



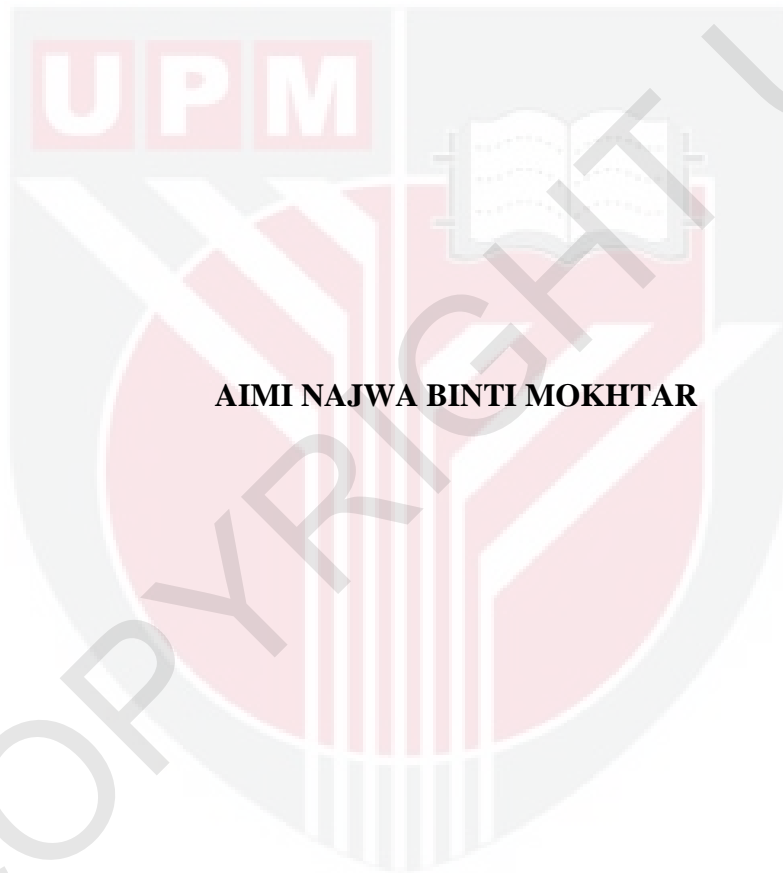
UNIVERSITI PUTRA MALAYSIA

***ANTIBACTERIAL EFFECT OF CINNAMON (CINNAMOMUM VERUM)
AGAINST BACTERIA ISOLATED FROM CATS WITH
OTITIS EXTERNA***

AIMI NAJWA BINTI MOKHTAR

FPV 2016 17

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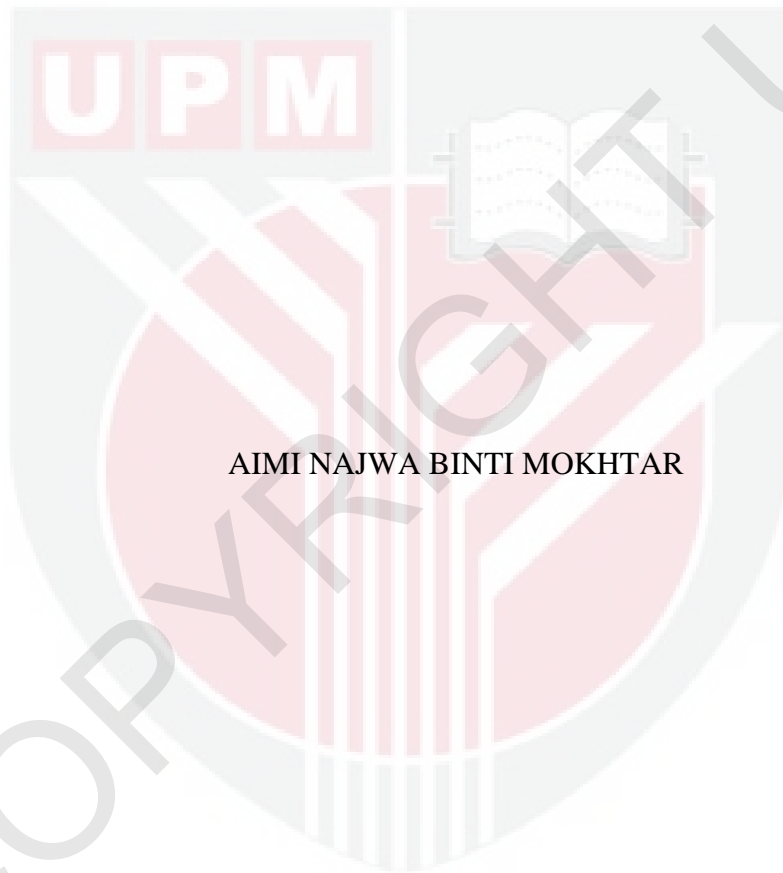


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**FACULTY OF VETERINARY MEDICINE
UNIVERSITI PUTRA MALAYSIA
SERDANG, SELANGOR**

2016

**ANTIBACTERIAL EFFECT OF CINNAMON (*CINNAMOMUM VERUM*)
AGAINST BACTERIA ISOLATED FROM CATS WITH
OTITIS EXTERNA**



AIMI NAJWA BINTI MOKHTAR

A project paper submitted to the
Faculty of Veterinary Medicine, Universiti Putra Malaysia
In partial fulfilment of the requirement for the
DEGREE OF DOCTOR OF VETERINARY MEDICINE
Universiti Putra Malaysia
Serdang, Selangor Darul Ehsan.

February 2016

It is hereby certified that I have read this project paper entitled “Antibacterial Effect of Cinnamon (*Cinnamomum verum*) against Bacteria Isolated from Cats with Otitis Externa” by Aimi Najwa Binti Mokhtar, and in my opinion it is satisfactory in term of scope, quality and presentation as partial fulfilment of the requirement for the course VPD 4999 – Project.

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(Supervisor)

DEDICATION

“This project is dedicated especially to my parents, my siblings, my nieces and
nephew, my friends and my cats”



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Alhamdulillah, thanks to the Almighty Allah S.W.T. for the strength given to finish this project.

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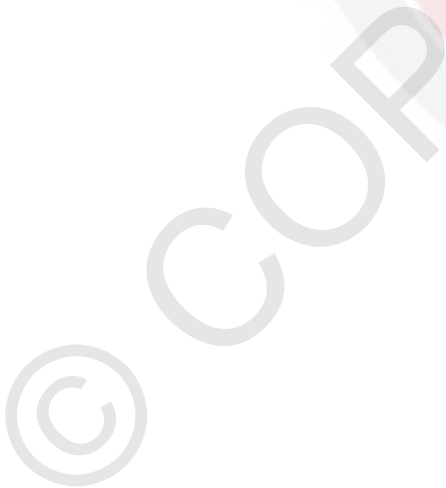
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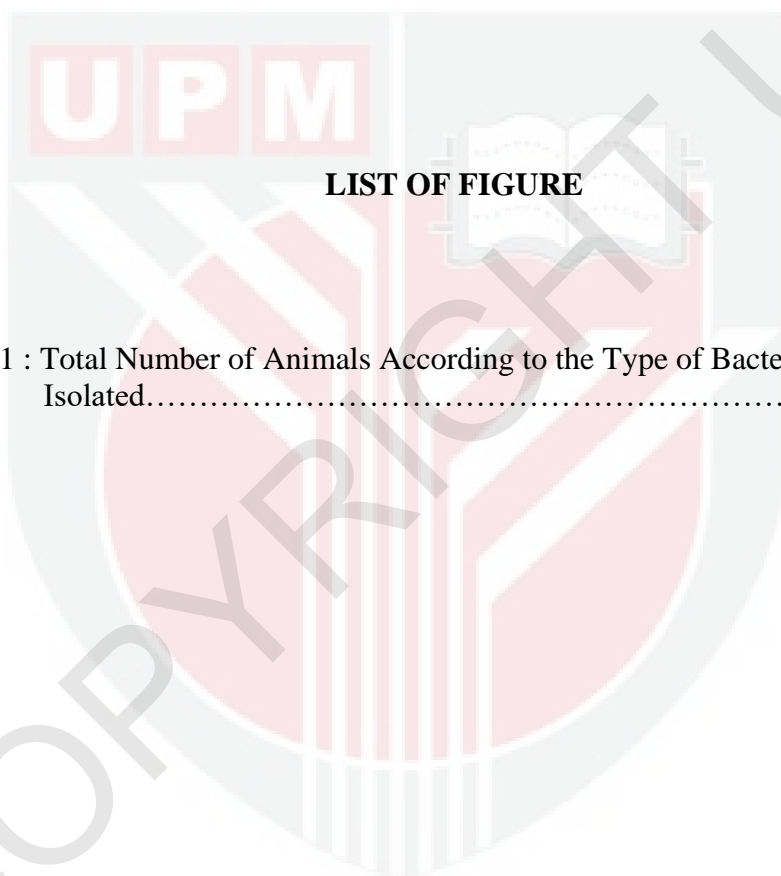


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ABSTRAK

Abstrak daripada kertas projek yang dikemukakan kepada Fakulti Perubatan Veterinar untuk memenuhi sebahagian daripada keperluan kursus VPD 4999 – Projek.

**KESAN ANTIBAKTERIA KULIT KAYU MANIS (*CINNAMOMUM VERUM*)
TERHADAP BAKTERIA YANG DIASINGKAN DARIPADA KUCING
YANG MENGHIDAP OTITIS EKSTERNA**

Oleh

Aimi Najwa binti Mokhtar

2016

Penyelia: Prof. Madya Dr. Siti Khairani binti Bejo

Tiga puluh (30) sampel sapuan telinga diambil dari kucing di klinik swasta. Sampel-sampel itu kemudiannya dikultur untuk tujuan pengasingan dan pengenalpastian bakteria. Sifat antibakteria *Cinnamomum verum* dikenalpasti dengan menjalankan ujian sensitiviti antibiotik (AST), inhibisi konsentrasi minima (MIC), bakteriasidal konsentrasi minima (MBC) terhadap bakteria yang diasingkan daripada sampel iaitu *Staphylococcus pseudintermedius*, *Staphylococcus intermedius*, *Staphylococcus hyicus*, *Enterococcus faecalis*, *Corynebacterium ulcerans*, *Bacillus* sp. dan *Aggregatibacter actinomycetemcomitans*. Pes kayu manis disediakan dengan mencampurkan serbuk kayu manis dengan air suling yang steril untuk digunakan dalam ujian-ujian tersebut. Kesemua bakteria yang diuji menunjukkan

kecenderungan terhadap pes kayu manis dan beberapa daripadanya menunjukkan rentan terhadap antibiotik yang digunakan secara komersil seperti marbofloxacin, doxycycline dan enrofloxacin. Diameter zon inhibisi (DIZ) bagi setiap bakteria yang diuji dengan antibiotik dan pes kayu manis menunjukkan perbezaan yang signifikan ($p = 0.000$). Hasil ujian MIC menunjukkan kadar aktiviti maksima bagi pes kayu manis adalah daripada 0.03 hingga 1.00g/ml. Hasil ujian MBC pula menunjukkan konsentrasi pes kayu manis yang mampu menghalang pertumbuhan atau membunuh bakteria yang diuji adalah daripada 0.03 hingga 0.67g/ml. Berdasarkan hasil ujian yang diperolehi, ia menunjukkan bahawa *Cinnamomum verum* mempunyai sifat antibakteria terhadap bakteria yang diasingkan daripada kucing yang menghidap otitis eksterna dan ia berpotensi untuk digunakan sebagai rawatan alternatif untuk kes-kes tersebut.

Kata Kunci: *Cinnamomum verum*, kesan antibakteria, otitis eksterna

ABSTRACT

An abstract of the project paper presented to the Faculty of Veterinary Medicine in partial fulfilment of the course VPD 4999 – Project.

ANTIBACTERIAL EFFECT OF CINNAMON (*CINNAMOMUM VERUM*)**AGAINST BACTERIA ISOLATED FROM CATS WITH****OTITIS EXTERNA**

By

Aimi Najwa Binti Mokhtar

2016

Supervisor: Assoc. Prof. Dr. Siti Khairani binti Bejo

Thirty (30) ear swab samples were taken from cats in a private clinic. The samples were then cultured on blood agar for isolation and identification of bacteria. Antibacterial effect of *Cinnamomum verum* was determined by conducting antibiotic sensitivity test (AST), minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) against bacteria isolated from the samples which include *Staphylococcus pseudintermedius*, *Staphylococcus intermedius*, *Staphylococcus hyicus*, *Enterococcus faecalis*, *Corynebacterium ulcerans*, *Bacillus* sp. and *Aggregatibacter actinomycetemcomitans*. Cinnamon paste was prepared by mixing cinnamon powder with sterile distilled water for the usage in the tests. All of the bacteria tested showed susceptibility towards the cinnamon paste and some showed resistance towards some of the commercially used antibiotics such as

marbofloxacin, doxycycline and enrofloxacin. There were significant differences in the diameter of inhibition zone (DIZ) of each bacterium tested against different antibiotics and the cinnamon paste ($p = 0.000$). The MIC test result of the cinnamon paste showed its maximum activity values that range from 0.03 to 1.00g/ml. The MBC test shown that the concentration of cinnamon paste that could have inhibited the growth or kill the bacteria tested was ranges from 0.03 to 0.67g/ml. Based on the test results, it suggested that *C. verum* do have antibacterial effect against bacteria isolated from cats with otitis externa and it may be used as the alternative treatment for such cases.

Keywords: *Cinnamomum verum*, antibacterial effect, otitis externa

1.0 INTRODUCTION

Otitis refers to the inflammation of ear canal or pinna regardless what the causes are or the clinical presentation (Jackson and Marsella, 2012). It can be categorized into otitis externa, otitis media and otitis interna. In cats, removal of normal ear canal excretion by using cotton swabs is the most common cause of feline otitis (Kennis, 2013). Cats that are kept in environment with high humidity level and frequently bathed are also to be at higher risk in getting otitis due to canal tissue maceration (Kennis, 2013).

Under normal circumstance, opportunistic bacteria are present in low number and are considered as normal flora. However, once the ear canal is affected, those bacteria will flare up and cause secondary infection. *Staphylococcus spp.*, *Escherichia coli*, *Corynebacterium spp.*, and *Pseudomonas spp.* are commonly isolated from cases of otitis (Dowling, 1996). In cases of acute otitis related with infections, *Malassezia* or gram positive cocci bacteria; typically *Staphylococcus pseudintermedius* can be seen with or without purulent infiltrate (Jackson & Marsella, 2012).

Aminoglycoside antibiotics such as neomycin and gentamicin are typically used for treatment of otitis externa due to their efficacy against staphylococci and gram negative bacteria (Dowling, 1996). Usage of fluoroquinolones such as enrofloxacin and marbofloxacin in treating cases of otitis has also been practiced nowadays. However, there are adverse effects from the uses of this type of antibiotics and some bacteria start to develop resistant to common antibiotics. Therefore, an alternative medication is needed to overcome the problem.

Cinnamomum verum which is also known as *Cinnamomum zeylanicum* has essential oil as its important characteristic. The essential oil components such as cinnamaldehyde and eugenol are the unique traits of this herb that allows it to act as the antibacterial agent. One of its mechanisms of actions is altering the bacterial membrane permeability when it is used synergistically with other antibiotic against gram negative bacteria (Hemaiswarya and Doble, 2009). However, there is lack of information on the antibacterial properties of *C. verum* sticks against bacteria isolated from cats with otitis externa. Hence the objectives of this study were

1. to isolate and identify the common bacteria present in the ear of cats with otitis externa.
2. to determine the presence of antimicrobial effect of *C. verum* to bacterial isolated from cats with otitis externa.

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