ANTI-CHOLINERGIC AND ANTI-MICROBIAL PROPERTIES OF *Ceriops tagal* (Temu)

NURUL KHAIRIAH BINTI ABDUL LATIFF

SCHOOL OF MARINE SCIENCE AND ENVIRONMENT
UNIVERSITI MALAYSIA TERENGGANU

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ANTI-CHOLINERGIC AND ANTI-MICROBIAL PROPERTIES OF *Ceriops tagal* (Temu)

By

NURUL KHAIRIAH BT ABDUL LATIFF

Research Report submitted in partial fulfillment of the requirements for the degree of Bachelor of Science (Marine Biology)

Department of Marine Science

School of Marine Science and Environment

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DECLARATION AND VERIFICATION REPORT

FINAL YEAR RESEARCH PROJECT

It is hereby declared and verified that this research report entitled Anti-cholinergic and Antimicrobial Properties of *Ceriops tagal* (Temu) by Nurul Khairiah bt Abdul Latiff. Matric No. UK25151 have been examined and all errors identified have been corrected. This report is submitted to the School of Marine Science and Environment as partial fulfillment towards obtaining the Degree of Marine Biology School of Marine Science and Environment, Universiti Malaysia Terengganu.

Verified by:

.....

First Supervisor

Name: DR. IBRAHIM MOHAMED SULIMAN ELDEEN

Official stamp: Lecturer
Institute of Marine Biotechnology
Universiti Malaysia Terengganu
21030 Kuala Terengganu, Terengganu

Date: 10/06/2014

.....

Second Supervisor

Name: DR. KESAVEN A/L BHUBALAN

Official stamp: Lecturer
School of Marine Science and Environment
Universiti Malaysia Terengganu
21030 Kuala Terengganu

Date: 7/7/14

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LIST OF ABBREVIATIONS

abs	-	absorbance
ACh	-	acetylcholine
AChE	-	acetylcholinesterase
AD	-	Alzheimer's disease
ATCI	-	acetylthiocholine iodide
BSA	-	bovine serum albumin
DTNB	-	5, 5-dithiobis-2-nitobenzoic acid
$FeCl_3$	-	ferum (III) chloride
g	-	gram
HCl	-	hydrochloric acid
H_2SO_4	-	sulphuric acid
INT	-	p-iodotrotetrazzolium violet
M	-	molarity
$MgCl_2.6H_2O$	-	Magnesium Chloride Hexahydrate
MH	-	Mueller-Hinton agar
MIC	-	minimum inhibitory concentration
mmol	-	milimol
NaCl	-	sodium chloride
nm	-	nanometer
U	-	unit

ABSTRACT

Finding natural antimicrobial compounds with minimum side effects on health is important due to increasing numbers of antibiotic-resistant strains. Although there is currently no cure for Alzheimer's disease (AD), new treatments are on the horizon as a result of accelerating insight into the biology of the disease. Mangrove plants have extensively been used in medicinal fields. In the present study, the leaves and roots of *Ceriops tagal* were prepared by using 3 different solvents including: dichloromethane, ethyl acetate and methanol sequentially. This study aimed to determine the antimicrobial, phytochemical screening and also anticholinesterase properties by using the mangrove plants. Antimicrobial activities were tested against five antibiotic-resistant and pathogenic bacteria which are *Bacillus cereus, Staphylococcus aureus*, *Salmonella typhii*, *Escherichia coli* and *Klebsiella pneumonia* by using the disc-diffusion and micro dilution assay. Results showed that the methanol extract had the best results while the dichloromethane extract appeared weaker in both disc diffusion and micro dilution assay. The phytochemical screening was done using standard methods. The methanolic leaves and roots extracts of *C.tagal* indicated the presence of many secondary metabolites such as tannins, alkaloids, carbohydrates, saponins and terpenoids while the dichloromethane extract did not show indication of presence of these chemicals. An anti-cholinergic effect was determined using acetylcholinesterase enzyme inhibition assay by using micro-plate assays. For micro-plate assays, all of the *C.tagal* extracts showed different inhibitory effects. The highest percentage of inhibition was recorded by dichloromethane roots

extract and methanolic extract of freeze dry which were 90 % and 80 % respectively. Inhibition percentage recorded for galanthamine (the positive control) was 70 %.

As it concludes that, *C.tagal* extract has the antimicrobial properties and anticholinesterase properties throughout the test that been carried out as they present of secondary metabolites which used in medicine field.

Keywords: Alzheimer's disease; *Ceriops tagal*; Antimicrobial properties; Phytochemical screening; Anticholinesterase properties

Sifat Anti-Kolinesteres dan Anti-Mikrobial *Ceriops tagal* (Temu)

ABSTRAK

Mencari sebatian antimikrob semulajadi dengan kesan sampingan yang minimum ke atas kesihatan adalah penting kerana jumlah strain antibiotik tahan yang semakin meningkat. Walaupun terdapat masa ini tiada penawar untuk penyakit Alzheimer (AD), rawatan baru masih lagi dicari bagi mempercepatkan kefahaman tentang biologi penyakit ini. Tumbuh-tumbuhan bakau telah meluas telah digunakan dalam bidang perubatan. Dalam kajian ini , daun dan akar *Ceriops tagal* telah disediakan dengan menggunakan 3 pelarut yang berlainan termasuk: diklorometana , etil asetat dan methanol secara berurutan. Kajian ini bertujuan untuk menentukan anti-mikrob , pemeriksaan fitokimia dan juga sifat-sifat antikolinesteres dengan menggunakan tumbuh-tumbuhan bakau. Aktiviti antimikrob telah diuji terhadap lima bakteria antibiotik tahan dan patogen iaitu *Bacillus cereus, Staphylococcus aureus, Salmonella typhii , Escherichia coli dan Klebsiella pneumoniea* dengan menggunakan cara cakera penyebaran dan mikro pencairan. Keputusan menunjukkan bahawa ekstrak metanol mempunyai hasil yang terbaik manakala ekstrak diklorometana muncul lemah dalam kedua-dua penyebaran cakera dan mikro pencairan eksperimen. Pemeriksaan fitokimia telah dilakukan dengan menggunakan kaedah piawai. Daun metanol dan akar ekstrak *C.tagal* ditunjukkan kehadiran ramai metabolit sekunder seperti tannin, alkaloid, karbohidrat, saponin dan terpenoid manakala ekstrak diklorometana tidak menunjukkan tanda kehadiran bahan kimia. Kesan anti-kolinergik telah ditentukan menggunakan kaedah perencatan enzim acetilkolinesteres dengan menggunakan ujian mikro plat. Untuk ujian mikro plat, semua ekstrak *C.tagal* menunjukkan kesan yang berbeza. Peratusan tertinggi perencatan dicatatkan bagi

ekstrak akar ekstrak diklorometana dan ekstrak metanol kering pembekuan yang masing-masing 90.00 % dan 80.22 %. Peratusan perencatan dicatatkan galanthamine (kawalan positif) ialah 69.87 %. Kesimpulannya, ekstrak *C.tagal* mempunyai sifat-sifat anti-mikrob dan antikolinesteres diatas seluruh ujian yang telah dijalankan dan mereka mempunyai metabolit sekunder yang digunakan dalam bidang perubatan.

Kata kunci: Penyakit Alzheimer; *Ceriops tagal*; Ciri-ciri antimikrob; Pemeriksaan fitokimia; Ciri-ciri antikolinesteres