

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

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SCHOOL OF MARINE SCIENCE AND ENVIRONMENT
UNIVERSITI MALAYSIA TERENGGANU

2014

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

By

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

Department of Marine Science

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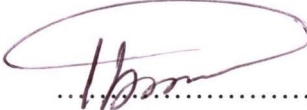


SCHOOL OF MARINE SCIENCE AND ENVIRONMENT
UNIVERSITI MALAYSIA TERENGGANU

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.

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TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	ii
TABLE OF CONTENTS	iii
LIST OF TABLES	v
LIST OF FIGURES	vi
LIST OF ABBREVIATIONS	vii
ABSTRACT	viii
ABSTRAK	x
CHAPTER 1: INTRODUCTION	
1.1 Background Study	1
1.1.1 Infectious diseases	1
1.1.2 Central nervous system disorders	2
1.2 Justification	3
1.3 Aims and Objectives	4
CHAPTER 2: LITERATURE REVIEW	
2.1 Mangrove	5
2.1.1 Mangrove Plants	5
2.1.2 Mangrove in Malaysia	6
2.1.3 Traditional Uses of Mangrove	6
2.2 <i>Ceriops tagal</i>	8
2.2.1 Botanical Description	8

2.2.2	Traditional Uses	10
2.2.3	Phytochemical characterization	11
CHAPTER 3: METHODOLOGY		
3.1	Plant Material	12
3.2	Disc Diffusion Assay	12
3.3	Micro-dilution antibacterial assay	13
3.4	Qualitative phytochemical analysis	14
3.5	Acetyl cholinesterase enzyme inhibitory activity	16
CHAPTER 4: RESULTS		
4.1	Antimicrobial activity	18
4.2	Qualitative phytochemical analysis	24
4.3	Acetyl cholinesterase enzyme inhibitory activity	25
CHAPTER 5: DISCUSSION		
5.1	Antimicrobial activity	27
5.2	Qualitative phytochemical analysis	30
5.3	Acetyl cholinesterase enzyme inhibitory activity	32
CHAPTER 6: CONCLUSION		34
REFERENCES		36
APPENDICES		42
CURRICULUM VITAE		44

LIST OF TABLES

Table		Page
4.1	Antimicrobial activity of the leaves and roots extracts of <i>Ceriops tagal</i> as determined using disc diffusion method	20
4.2	Minimum inhibitory concentration (MIC mg ml ⁻¹) of the leaves and roots extracts of <i>Ceriops tagal</i> as determined by the micro dilution assay	22
4.3	Phytochemical screening of the leaves and roots extracts of <i>Ceriops tagal</i> .	24
4.4	Inhibition (%) of acetylcholinesterase by the leaves and roots extracts of <i>Ceriops tagal</i> as determined using the Micro-plate assay	26
4.5	Inhibition (%) of acetylcholinesterase enzyme by galanthamine (positive control) as determined using the Micro-plate Assay	26

LIST OF FIGURES

Figure	Page
2.1 <i>Ceriops tagal</i> at the Setiu Wetland, Terengganu	10
4.1 Inhibition of bacterial growth by the leaves and roots (dichloromethane extract) of <i>Ceriops tagal</i> extracts against <i>Staphylococcus aureus</i> when detected using disc diffusion method	20
4.2 Inhibition of bacterial growth by the leaves and roots (dichloromethane extract) of <i>Ceriops tagal</i> extracts against <i>Salmonella typhi</i> when detected using disc diffusion method	21
4.3 Determination of minimum inhibitory concentration (MIC values) obtained by gentamycin (positive control) against the five pathogenic bacterial strains used. This was detected using the micro dilution assay	23
4.4 Determination of minimum inhibitory concentration (MIC values) obtained by leaves and roots (dichloromethane extract) of <i>Ceriops tagal</i> against the five pathogenic bacterial strains used. This was detected using the micro dilution assay	23

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 ₂ SO ₄	-	sulphuric acid
INT	-	p-iodotrotetrazzolium violet
M	-	molarity
MgCl ₂ .6H ₂ O	-	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-Mikrobia *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 antimikrob, 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 typhi*, *Escherichia coli* dan *Klebsiella pneumoniae* 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 antikolinergik 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 perencanaan 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