

**EXTRACTION OF *Centella asiatica* LEAVES:
POTENTIAL ANTIOXIDANT AND ANTIBACTERIAL
ACTIVITY ON SKIN**

SYARIFAH NURBALQIS IDID BINTI SYED TAUFIK IDID

**BACHELOR OF SCIENCE (Hons.) BIOLOGY
FACULTY OF APPLIED SCIENCES
UNIVERSITI TEKNOLOGI MARA**

AUGUST 2022

This Final year project report entitle “**Extraction of *Centella asiatica* Leaves: Potential Antioxidant and Antibacterial Activity on Skin**” was submitted by Syarifah Nurbalqis Idid Binti Syed Taufik Idid, in partial fulfilment of the requirements for the Degree of Bachelor of Sciences (Hons.) Biology, in the Faculty of Applied Science and was approved by

Pn. ~~Shafinas Binti~~ Abdullah
Supervisor
B. Sc. (Hons.) Applied Chemistry
Faculty of Applied Science
Universiti Teknologi MARA
02600 Arau
Perlis

En. Syukri Bin Noor Azman
Project Coordinator
B. Sc. (Hons.) Biology
Faculty of Applied Sciences
Universiti Teknologi MARA
02600 Arau
Perlis

Pn. Zalina Binti Zainal Abidin
Coordinator Programme
B. Sc. (Hons.) Physics
Faculty of Applied Sciences
Universiti Teknologi MARA
02600 Arau
Perlis

Date: August 2022

ABSTRACT

EXTRACTION OF *Centella asiatica* LEAVES: POTENTIAL ANTIOXIDANT AND ANTIBACTERIAL ACTIVITY ON SKIN

Centella asiatica has been used for centuries to treat a variety of ailments. Many studies have shown that it has antioxidant activity, antibacterial, antifungal and wound healing effects. The aims of this study are to identify the phytochemical constituents present in *Centella asiatica* leaves extracts, to investigate the antioxidant activity of the *Centella asiatica* extracts using DPPH radical scavenging assay and Total Phenolic Content and to examine the antibacterial activity of *Centella asiatica* leaves extracts using disc diffusion method. Initially, the leaves of *C. asiatica* were extracted via maceration process using 95% ethanol as solvent. According to this study, the percentage yields obtained is 13.44%. Six phytochemical screening test was conducted to determine the phytochemical constituent present in leaves of *C. asiatica* which are alkaloid, steroid, flavonoid, terpenoid, saponin, protein and amino acid. However, only four phytochemical constituents were identified from this plant which are alkaloid, steroid, flavonoids and terpenoids. The antioxidant activity of *C. asiatica* were investigated using DPPH radical scavenging assay and Total Phenolic Content. The ethanolic extracts of *C. asiatica* showed highest inhibitory DPPH free radical up 76.96% at 100 ppm. The total phenolic content obtain in this study is 0.61 mg GAE/g. Furthermore, antibacterial activity was done to investigate the effectiveness of *C. asiatica* leaves as antibacterial agent against gram-positive bacteria which is *B. Licheniformis* and gram-negative bacteria which is *E. coli*. Zone inhibition of *C. asiatica* was tested on three different concentrations which are 15 ppm, 30 ppm and 40 ppm. Both bacteria showed highest zone inhibition at 40 ppm which 16 mm for *B. licheniformis* and 15 mm for *E. coli*. *B. licheniformis* showed higher zone of inhibition in all concentrations as compared to *E. coli*. Hence, the ethanol extracts proved to be more effective against *B. licheniformis*. Based on the results obtained in this study, *C. asiatica* can be used as another alternative to replace synthetic antioxidants and as antimicrobial agents.

TABLE OF CONTENTS

	PAGE
ABSTRACT	iii
ABSTRAK	iv
ACKNOWLEDGEMENT	v
TABLE OF CONTENTS	vi
LIST OF TABLES	viii
LIST OF FIGURES	ix
LIST OF SYMBOLS	x
LIST OF ABBREVIATIONS	xi
CHAPTER 1 INTRODUCTION	1
1.1 Background of study	1
1.2 Problem statement	3
1.3 Research Questions	5
1.4 Significant of study	6
1.5 Objective of study	7
1.6 Scope and limitation of study	8
CHAPTER 2 LITERATURE REVIEW	10
2.1 Skin Structure	10
2.2 <i>Centella asiatica</i>	12
2.3 Constituent in <i>Centella asiatica</i>	14
2.3.1 Triterpenic Acids	16
2.3.2 Triterpenic Sugar Ester	17
2.3.3 Essential oil	18
2.4 Extraction of <i>Centella asiatica</i>	19
2.5 Preliminary Phytochemical Analysis	21
2.5.1 Flavonoid	21
2.5.2 Terpenoid	22
2.5.3 Steroids	22
2.5.4 Alkaloids	23
2.6 Antioxidant Activity	24
2.7 Antibacterial Activity	28
2.7.1 <i>Bacillus licheniformis</i>	29
2.7.2 <i>Escherichia coli</i>	30
2.7.3 Disc Diffusion Method	30

CHAPTER 3 METHODOLOGY	32
3.1 Materials and Chemicals	32
3.1.1 Raw Materials	32
3.1.2 Chemicals	32
3.2 Instruments and equipment	33
3.3 Extraction of <i>Centella asiatica</i>	33
3.4 Preliminary Phytochemical Analysis	34
3.4.1 Alkaloids	34
3.4.2 Flavonoids	35
3.4.3 Terpenoids	35
3.4.4 Protein and Free Amino Acids	35
3.4.5 Saponins	36
3.4.6 Steroids	36
3.5 Antioxidant Activity of <i>Centella asiatica</i>	36
3.5.1 DPPH Scavenging Activity	36
3.5.2 Determination of Total Phenolic Content (TPC)	38
3.6 Determination of Antimicrobial activity of <i>Centella asiatica</i>	40
3.6.1 Preparation of agar medium	40
3.6.2 Inoculum Preparation	41
3.6.3 Antibacterial activity of <i>Centella asiatica</i>	41
3.7 Flowchart of Experimental Procedure	42
CHAPTER 4 RESULTS AND DISCUSSION	43
4.1 Percentage of extraction yields	43
4.2 Preliminary Phytochemical Screening	44
4.3 Antioxidant Activity	47
4.3.1 DPPH Free Radical Scavenging Assay	47
4.3.2 Total Phenolic Content (TPC)	53
4.4 Antibacterial Activity	56
CHAPTER 5 CONCLUSION AND RECOMMENDATIONS	61
5.1 Conclusion	61
5.2 Recommendations	62
CITED REFERENCES	64
APPENDICES	70
CURRICULUM VITAE	77