

ANALYSIS OF *Acalypha indica* EXTRACTS FOR
ANTIOXIDANT AND ANTIBACTERIAL ACTIVITIES

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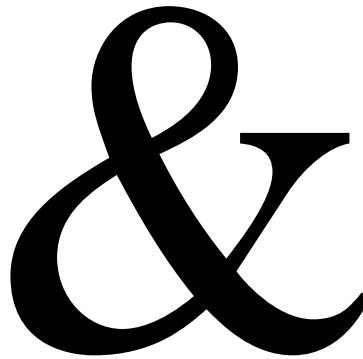
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For unwavering love, support and encouragement

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ABSTRACT

Herbal medicines are made from herbs to treat or prevent disease which has been used since ancient. This present study was undertaken to investigate antioxidant and antibacterial activity of leaf-stem, root and whole plant of *Acalypha indica* by using aqueous-ethanol, aqueous-vinegar and water as solvents. Soxhlet apparatus was utilized in preparing the extracts by using fresh sample. All samples were evaluated for antioxidant activity by using DPPH assay and antibacterial activity, which assessed through disc diffusion method. *Staphylococcus aureus*, *Enterococcus faecalis*, *Escherichia coli* and *Pseudomonas aeruginosa* were used to analyze the antibacterial activity at different concentration of the extracts. Aqueous-ethanol extract of leaf-stem was found possessing highest activity of antioxidant with IC₅₀ at 21 µg/mL. Meanwhile, all parts of aqueous-ethanol and aqueous-vinegar extracts were susceptible against all those bacteria whilst water extracts were resistance. Presence of bioactive compounds such as flavonoids, phenolic compounds and alkaloids would be the vigor core of those activities. This study suggests the latent potential of *Acalypha indica* to be used as natural source for herbal medicine or any industrial related applications.

ABSTRAK

Ubatan herba diperbuat daripada tumbuhan herba untuk merawat atau mencegah penyakit dan telah digunakan sejak dahulu kala. Kajian ini dijalankan untuk menyiasat kadar aktiviti antioksidan dan antibakteria bagi ekstrak daun-batang, akar dan keseluruhan pokok *Acalypha indica* dengan menggunakan akueus-alkohol, akueus-cuka dan air sebagai bahan pelarut. Radas Soxhlet digunakan untuk penyediaan ekstrak dengan menggunakan sampel segar. Aktiviti antioksidan bagi kesemua sampel dinilai dengan menggunakan ujian DPPH, manakala aktiviti antibakteria dinilai melalui kaedah 'disc diffusion'. *Staphylococcus aureus*, *Enterococcus faecalis*, *Escherichia coli* dan *Pseudomonas aeruginosa* telah digunakan dalam menganalisis aktiviti antibakteria pada kepekatan ekstrak yang berbeza. Hasil menunjukkan, ekstrak akueus bagi daun-batang mempunyai aktiviti yang tertinggi dengan IC_{50} pada kepekatan 21 $\mu\text{g/mL}$. Kesemua bahagian pokok bagi ekstrak akueus-etanol dan akueus-cuka berupaya menentang bakteria-bakteria tersebut, manakala ekstrak air gagal menentangnya. Kehadiran kompon bioaktif seperti flavonoid, kompon fenol, dan alkaloid adalah teras utama yang menyumbang kepada aktiviti-aktiviti itu. Kajian ini membuktikan kebolehan terpendam *Acalypha indica* untuk dimanipulasi sebagai bahan semulajadi dalam perubatan herba atau mana-mana industri yang berkenaan.

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LIST OF SYMBOLS AND ABBREVIATIONS

A	-	Absorbance
ANOVA	-	Analysis of Variance
ATCC	-	American Type Culture Collection
DMSO	-	Dimethylsulfoxide
DPPH	-	2,2-diphenyl-1-picrylhydrazyl
<i>etc</i>	-	Et cetera
FRIM	-	Forest Research Institute of Malaysia
g	-	Gram
M	-	Molar
mg	-	Milligram
mL	-	Milliliter
mm	-	Millimetre
NHCP	-	National Health Care Programmes
nm	-	Nanometre
R	-	Resistant
UTI	-	Urinary tract infection
UV	-	Ultra violent
WHO	-	World Health Organization
°C	-	degree Celsius
µg	-	Microgram
µL	-	Microliter
%	-	Percentage
>	-	Greater than
<	-	Less than
=	-	Equal to

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

Malaysia is bestowed with botanical wealth and diverse types of herbs. Those herbs possess medicinal properties which give enough purpose for people to utilize them since ancient. In these recent years, healthcare industry started diverting their heed towards the application of plant-based product as organic care products to meet the growing demands. People globally much perceive that organic product such plant-based product is safer to use than synthesized chemical-based product.

Acalypha indica known as ‘Kucing Galak’ in Malaysia, commonly treated as noxious weed which usually found in roadsides and low altitude of agricultural lands. This herb belongs to Euphorbiaceae family, also called as Ceka Emas, Cika Mas and Rumput Lis-lis by local (*Forest Research Institute Malaysia [FRIM], 2013*). This plant has been applied in alternative medicine in the Indian, and useful in treating many diseases like pneumonia, asthma, rheumatism and use as ailments (Jagatheeswari *et al.*, 2013). Poultice of this herb is applied to treat bed sore and wound and its leaves reported to possess contraceptive activity (Bourdy & Walter, 1992).

Relatively, herbal medicine has been a part of human evolution and still applied till nowadays. Herbal extracts are used for many purposes, including stress reliever, muscle relaxer, anti-venom, remedy for infection and many more, depending on type of plants used. Hence, possess important properties such as antioxidant and antibacterial would be a remarkable characteristic for a best extract. Antioxidant, compound capable of inhibit or delay the oxidation by neutralizing free radicals toxic effects (He *et al.*, 2012). *Acalpha indica* is one of the plants that believed possessed such properties which may help fill up the needs of interest both in industry and scientific research towards application of medicinal herbs (Sanseera, 2012; Shanmugapriya, 2011).

1.2 Statement of Problem

Acalypha indica is well-known herbs use by traditional medicine practitioner as one of strong herbs that successively help in curing and used as preventive measures in many diseases. Using vinegar or aqueous-ethanol for extraction considered as a new thing since researchers commonly used solvents such as methanol, ethanol and acetone in extraction of this plant. On the side of sample preparation, researchers commonly chose dried over fresh samples. In addition, most of previous study focusing on leaf instead of whole plant or other part such roots and stem. Thus, some lingering question to be answer including, does *A. indica* extract is a worth useful product to use? Which solvent likely the best to use, in term of its part or sample chosen based on antioxidant activity and antimicrobial activity?

1.3 Specific Objective of Study

1. To extract *Acalypha indica* leaf-stems, roots and whole plants using aqueous ethanol, aqueous vinegar and water as solvents
2. To analyze the antioxidant activity of *Acalypha indica* extracts
3. To evaluate the antibacterial activity of *Acalypha indica* extracts using disc diffusion method

1.4 Significance of Study

Acalypha indica is believed possessing potent ability in matter of preventive as well as curative. This study is conducted to investigate the potential antioxidant properties and its antimicrobial activity against some common bacterial. This finding would be beneficial and help contributing for the better development in healthcare indirectly.

1.5 Scope of Research

The study focuses on the extraction of *Acalypha indica* using aqueous-ethanol, aqueous-vinegar and water as solvents by using Soxhlet apparatus. This study also involved on assessing the antioxidant and antimicrobial activities of the mentioned plant.

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