

**COMPARISON OF ANTI-BACTERIAL ACTIVITIES OF
DRIED *HOUTTUYNIA CORDATA* THUNB.
(YU XING CAO) ETHANOLIC EXTRACTS
AGAINST SELECTED BACTERIA**

BY

CHIA WOON LING

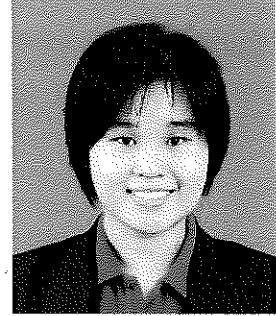
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DECLARATION

I hereby declare that, except for specific references which have been duly acknowledged, this project is the result of my research and it has not been submitted either in part or whole for any other degree elsewhere.



A handwritten signature in black ink, appearing to read 'Chia Woon Ling' in a cursive style.

1st December 2015

CHIA WOON LING

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ABSTRACT

The study was conducted to compare the anti-bacterial activities of 50% and 95% ethanol extract of dried *Houttuynia cordata* Thunb. (Yu Xing Cao) against selected bacteria. The objectives were to determine the anti-bacterial effect of *Houttuynia cordata* against three different bacteria which are *Staphylococcus aureus*, *Bacillus subtilis*, and *Escherichia coli*. Two different concentration of ethanol were used in the experiment, which are 50% ethanol and 95% ethanol. In the first procedure, powder form dried *Houttuynia cordata* and ethanol 50% at a ratio of 1:5 were used, the powder was suspended in 50% ethanol for 1 day. The second extraction process consisted powder form dried *Houttuynia cordata* and ethanol 95% at a ratio of 1:5, the powder was suspended in 95% ethanol for 7 day. Disc diffusion test is to determine the anti-microbial activities for the two plant extracts. Ethanol 50% and 95% were used as the negative control while Gentamicin was used as positive control groups. Data were collected by measuring the zone of inhibition with ruler or Vernier calliper. There were no zone of inhibition shown by the 50% and 95% ethanol extract of *H. cordata*, indicating that the extraction do not contain anti-bacterial effect.

TABLE OF CONTENTS

	Page No.
DECLARATION	ii
ACKNOWLEDGEMENT	iii
ABSTRACT	iv
TABLE OF CONTENTS	v
LIST OF TABLES	viii
LIST OF FIGURES	ix
LIST OF ABBREVIATIONS	xii
LIST OF SYMBOLS	xiii
CHAPTER 1: INTRODUCTION	1
1.1 Research Objectives	3
1.2 Research Hypothesis	3
1.3 Problem Statement	4
CHAPTER 2: LITERATURE REVIEW	5
2.1 Medicinal Plants	5
2.1.1 Plant Derived Drug	6
2.2 <i>Houttuynia cordata</i> Thunb.	7
2.2.1 Background	7
2.2.2 Traditional Used of <i>Houttuynia cordata</i> Thunb.	9
2.2.3 Chemical Compounds	12
2.2.4 Pharmacology	14
2.2.5 Previous Study on Anti-microbial Activity	15
2.3 Microorganisms	17
2.3.1 <i>Escherichia coli</i>	17
2.3.2 <i>Staphylococcus aureus</i>	19
2.3.3 <i>Bacillus subtilis</i>	22

2.4	Anti-microbial Resistance	23
2.5	Concentration of Ethanol Versus Effectiveness	26
CHAPTER 3: METHODOLOGY		27
3.1	Materials and Equipment	27
3.1.1	Materials	27
3.1.2	Equipment	27
3.2	Plant Materials	29
3.2.1	Collection of Plants Material	29
3.2.2	Preparation of Plant Samples	30
3.3	Extraction Procedure	30
3.4	Bacteria	31
3.5	Preparation of Media and Reagents	32
3.5.1	Preparation of Nutrient Agar	32
3.5.2	Preparation of Crystal Violet	32
3.5.3	Preparation of Methylene Blue	32
3.5.4	Preparation of Safranin	32
3.5.5	Preparation of Iodine Solution	33
3.5.6	Preparation of Ethanol	33
3.6	Gram Stain	34
3.7	Anti-Microbial Susceptibility Testing	34
3.7.1	Preparation of Plant Impregnated Disc	34
3.7.2	Application of Impregnated Disc	35
3.8	Research flow	36
3.9	Statistical Analysis	37
CHAPTER 4: RESULT		38
4.1	Evaluation of Plant Extract Anti-microbial Activity	38

CHAPTER 5: DISCUSSION

47

CHAPTER 6: CONCLUSION

54

REFERENCE

55

LIST OF TABLES

Table		Page No.
2.1	Traditional uses of <i>Houttuynia cordata</i> in China	9
2.2	Previous anti-microbial studies on <i>Houttuynia cordata</i>	16
2.3	Characteristics of intestinal infections caused by <i>Escherichia coli</i>	19
2.4	Basic guideline for the choice of the ethanol percentage to optimize the activity of the final liquid extracts	26
4.1	Zone of inhibition of ethanol extract of <i>Houttuynia cordata</i> towards three different bacteria strain	39
4.2	Anti-microbial activities against <i>Bacillus subtilis</i>	42
4.3	Anti-microbial activities against <i>Staphylococcus aureus</i>	43
4.4	Anti-microbial activities against <i>Escherichia coli</i>	44

LIST OF FIGURES

Figure	Page No.
2.1 Fresh <i>Houttuynia cordata</i>	8
2.2 Dried <i>Houttuynia cordata</i>	8
2.3 <i>Escherichia coli</i> gram stain	17
2.4 <i>Staphylococcus aureus</i> gram stain	20
2.5 <i>Bacillus subtilis</i> gram stain	22
3.1 Chemical reagents	27
3.2 Incubator	28
3.3 Pipette	28
3.4 Sterile cotton swab (Inter-Care)	28
3.5 Collection of dried <i>Houttuynia cordata</i>	29
3.6 <i>Houttuynia cordata</i> in coarse powder form	30
3.7 Filtration of 50% and 95% of <i>Houttuynia cordata</i> ethanol extraction	31
3.8 Bacteria strain of (1) <i>Bacillus subtilis</i> , (2) <i>Staphylococcus aureus</i> and (3) <i>Escherichia coli</i>	31

Figure	Page No.
3.9 Ethanol 50% and 95%	33
3.10 Impregnated disc placed on the nutrient agar plate	35
3.11 Methodology flow of experiment	36
4.1 Petri dish in incubator after 24 hours	38
4.2 Zone of inhibition of <i>Houttuynia cordata</i> ethanol extraction against different bacteria	40
4.3 Mean of gentamicin against <i>Bacillus subtilis</i> , <i>Staphylococcus aureus</i> and <i>Escherichia coli</i>	41
4.4 Anti-microbial activity of <i>Houttuynia cordata</i> ethanol extract against <i>Bacillus subtilis</i>	45
4.5 Anti-microbial activity of <i>Houttuynia cordata</i> ethanol extract against <i>Staphylococcus aureus</i>	45
4.6 Anti-microbial activity of <i>Houttuynia cordata</i> ethanol extract against <i>Escherichia coli</i>	45
4.7 Zone of inhibition measured on petri dish of <i>Bacillus subtilis</i>	46
4.8 Zone of inhibition measured on petri dish of <i>Staphylococcus aureus</i>	46
4.9 Zone of inhibition measured on petri dish of <i>Escherichia coli</i>	46

Figure

Page No.

- 5.1 Petri dish with mixture of colonies of *Staphylococcus aureus* and unknown bacteria 52
- 5.2 *Escherichia coli* tested by disc diffusion method 53

LIST OF ABBREVIATIONS

AD	Anno Domini
ADP	Adenosine diphosphate
BC	Before Christ
CNS	Central Nervous System
COX-2	Cyclooxygenase-2
DCA	Deoxycholate citrate agar
EMB	Eosin-methylene blue
HCE	Ethanol extract of <i>Houttuynia cordata</i>
HL	Human promyelocytic leukemia cells
HLPC-DAD-MS	High-performance liquid chromatography with diode-array detection and mass spectrometry
HSV	Herpes-Simplex Virus
MIC	Minimal Inhibition Concentration
MRSA	Methicillin-resistance <i>Staphylococcus aureus</i>
SARS	Severe Acute Respiratory Syndrome
SD	Standard Deviation
SS	Salmonella-Shigella agar
TNF	Tumor Necrosis Factor
TSS	Toxic Shock Syndrome
UTI	Urinary Tract Infection
WHO	World Health Organisation

LIST OF SYMBOLS

α	Alpha
β	Beta
$^{\circ}\text{C}$	Degree Celsius
\pm	Plus-Minus
$=$	Equal Signs
$()$	Parentheses
$-$	Horizontal Line for Division
$>$	Greater-than sign
$\%$	Percent
$\$$	Dollar sign
cm	Centimeter
g	Gram
μ	Micro
μm	Micrometer
mg	Milligram
ml	Milliliter
mm	Millimeter
pH	Potential of Hydrogen

CHAPTER 1: INTRODUCTION

Medicinal plants are a vital part of our natural wealth. It is regrettable that human has limited knowledge towards the medicinal plants, but it is fortunate that many countries still carry out the documentation of traditional knowledge on medicinal plants. Such initiative is crucial for the transmission of traditional knowledge to the younger generation and to increase the awareness towards conserve highly demanded or rare plant species in traditional medicine (Ong et al., 2011).

Malaysia is one of the countries that contribute to the knowledge of traditional medicinal plants as documentation on herbal plants is on-going in this country. Previous such studies include that by Faridah and Nurulhuda (1999), Kulip (2003), Lin (2005), Samuel et al.(2010), and Ong et al. (2012). Faridah and Nurulhuda (1999) found 98 plant species with 140 different uses at Ayer Hitam Forest, Selangor. Survey work on Sabah by Kulip (2003) revealed that the Murut used 68 species plants for medical purpose. A study carried out by Lin (2005) and Ong et al. (2012) contribute to the documentation of medicinal plants usage by the native people of Peninsular Malaysia, the former researcher documented 16 species while the latter recorded 53 species of medicinal plants.

By understanding the usage of herbal plants in the traditional medical system can help discover the potential constituents applicable to modern medicine (Mamedov, 2012). Quinine, vincristine, digoxin and digitoxin, emetine and artemisinin are examples of modern drugs derived from medicinal plants. In the last 30 years, epidemiology of invasive infections has changes, bacterial illness is rampant. Therefore, the discovery of effective anti-microbial agents to tackle anti-biotic-resistant strains of pathogens is vital (Zhang et al., 2013). In the year 2011, it was found that 10% of drug marketed are natural products and their derivatives at 29% (Bade et al., 2010). From the data present by Newman et al. (2003), new chemical entities that are associated with natural product or natural-derived product in the anti-bacterial field is 78%. Research works are carried out for decades to search for the potential therapeutic actions of medical plants. For example, Berberine which can be

found in the *Berberis aquifolium* (Oregon grape), *Berberis vulgaris* (Barberry), and *Berberis aristata* (Tree Turmeric) serve as good anti-bacterial against multi drug resistant *Escherichia coli* (Bandyopadhyay et al., 2013). Houttuyninum that can be found in *Houttuynia cordata* had been reported to inhibit the growth of *Staphylococcus aureus* and *Streptococcus pneumoniae* (Xiaoli et al., 2009).

Houttuynia cordata is one of the Traditional Chinese Medicine herbs that had long been studied for its anti-bacterial effect. *Houttuynia cordata* is the sole species in the family of Saururaceae family. It is commonly called Lizard's tail in English; Yu-Xing-Cao or Chou-Xing-Cao in China; dokudame in Japan; E-Sung-Cho in Korea; Khao- tong or Plu-khao in Thailand; giáp cá or diệp cá in Vietnam; Gandhi Jhar in Nepal (Jiangang et al., 2013; Rathi et al., 2013). *Houttuynia cordata* has been used as effective traditional medicine herbs as well as food. Research has shown that the herbs contain 16 types of amino acids, vitamin and trace elements that are conducive to health (Li and Jiang, 2009). It has been used as edible vegetables in China and India; while in Japan it is used externally to treat wound of insect bites (Li and Jiang, 2009; Rathi et al., 2013; Yoshino et al., 2005).

The usage of *Houttuynia cordata* attracts the attention of scholars. Research are done in different field to investigate the effectiveness of this herbal plants and to discover the hidden therapeutic potentials. But up to now, the knowledge of the effectiveness of anti-bacterial effect of different concentration of ethanolic extraction is still a missing part in current research. Therefore, this studies is carried out to investigate further the anti-bacterial effect of 50% and 95% of dried *Houttuynia cordata* Thunb. ethanolic extracts towards *Staphylococcus aereus*, *Bacillus subtilis* and *Escherichia coli*.