COMPARISON OF ANTI-BACTERIAL ACTIVITY USING METHANOLIC AND ETHANOLIC EXTRACT OF *HOUTTUYNIA CORDATA* THUNB. (YU XING CAO)

By

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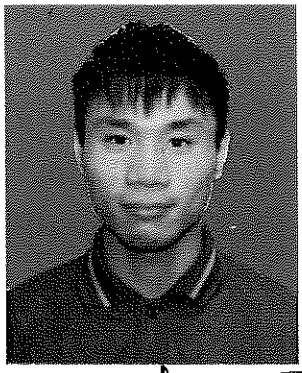
DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at INTI or any other institutions.



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ABSTRACT

This study was conducted to know and compare the anti-bacterial activity of methanolic and ethanolic extracts of *Houttuynia cordata* Thunb.. (HCT) against *Staphylococcus aureus, Bacillus subtilis, Escherichia coli and Pseudomonas aeruginosa.* Microorganisms were grown in culture medium (Nutrient Agar). Disc diffusion method for anti-microbial susceptibility testing was performed according to the standard Kirby Bauer method. The Smith filter paper 102 discs of 6mm sizes was impregnated with the 100mg/ml of plant extracts which were placed on Nutrient Agar plates seeded with bacterial cultures. Gentamicin (10µl) was used as positive control while methanol and ethanol were used as negative control. The anti-bacterial activities were assessed by the absence or presence of zone of inhibition after incubating at 37℃ for 24 hours in inverted position. In this study, the methanolic and ethanolic extract did not showed any zone of inhibition.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AA	Anti-oxidant Activity
AcHz	Acetyl Hydrazine
ACTs	Artemisinin-based combination therapies
AUCs	Area under Curves
ASA	Acetylsalicylic Acid
DiHS	Drug-induced hypersensitivity syndrome
GIT	Gastrointestinal Tract
GPO	Government Pharmaceutical Organization
HCT	*Houttuynia cordata* Thunb.
MICs	Minimum Inhibitory Concentrations
MBC	Minimum Bactericidal Concentration
MRSA	Methicilin Resistant Staphyloccocus Aureus
NCSE	Non-Convulsive Status Epilepticus
ND	Not Detected
NE	North East
IE	Internationale Einheiten
IU	International Unit
INH	Isonicotinylhydrazine
SJS	Steven- Johnson Syndrome
Tdp	Torsade de Pointes
TFC	Total Flavonoids Content
TPC	Total Phenolic Content
UTI	Urinary Tract Infection
WHO	World Health Organization

LIST OF SYMBOLS

%	Percentage
±	Plus Minus
<	Less Than
>	More Than
°C	Degree Celcius
cm	Centimeter
mm	Millimeter
mg	Miligram
L	Liter
mL	Mililiter
g	Gram
SD	Standard Deviation
µl	Microliter

CHAPTER 1: INTRODUCTION

Herbal medicine have been used in far eastern countries long time ago and Chinese, particularly, utilized herbs and plants in treating diseases for more than 8000 years (Drašar and Moravcova, 2004). The World Health Organization (WHO) estimated that over 80% of the people in developing countries rely on traditional remedies such as herbs for their daily needs (Ekor, 2014). The primary reason is stems from the belief that green medicine is safe and dependable as compared to those costly synthetic drugs with adverse effect (K. Harish Kumar et al., 2010).

Discovery of anti-bacterial drugs shown to be effective on the control of bacterial infection. However, some of the pathogens rapidly become resistant to many of the first discovered effective drugs (Chowdhury et al., 2014). Furthermore, anti-biotic resistance has become a global concern in recent years, especially in developing countries such as India because infectious diseases are one of the major causes of the mortality in these countries (Chanda and Nair, 2006).

With the development of drug resistance and the rising of undesirable adverse effects from certain anti-biotics (WHO Traditional Medicine Strategy 2002-2005, 2002), this has led to the discovery of new anti-bacterial agents especially those from medicinal plants (Mitscher et al., 1987). Now with 78% of the new chemical entities being natural or natural product-derived molecules, there has been a promising alternative treatment of infectious diseases using medicinal plants (Newman, Cragg and Snader, 2003). According to a research done by Philip et al (2009) on determine antimicrobial activity of some medicinal plants from Malaysia, it was found that *curcuma manga* shows a strong antibacterial activity against *Pseudomonas aeruginosa, Staphylococcus aureus* and *Bacillus subtilis*.

Houttuynia cordata Thunb. the sole species in the genus *Houttuynia* that belongs to the *Saururaceae* family, is a flowering and perennial herb native to China, Japan, Korea and Southeast Asia (Fu et al., 2013). According to RS.Rathi et al (2013), the commonly used name of *H.cordata* Thunb. are *Heart-Leaved Houttuynia*,

Lizard's tail in English; *Ja-myrda* or *Jmyr-doh* in Khasi; *Machha-turi* in Garo; *Hmar-Aithang* and *Pnar-Jarmendo* in Assam; *Toning khokin* in Manipur; *Gandhi Jhar* in Nepal and *Ghandhay jhar* in North Bengal and Sikkim; *fishwort*, *Doku-Dami* (Japan); *Giấp Cá(Vietnam)* and *Yu Xing Cao* (China).

It grows optimally at stream edges, wet woodlands; damp grassy places, paddy field margins and roadsides (M. Fu et al., 2007). Their geographical distributions are among Bhutan, China, Japan, Indonesia, Korea, Myanmar, Nepal, Thailand, Taiwan, Vietnam, North-West Himalayan Region and North East (NE) region of India (RS. Rathi et al, 2013). The leaves and rhizomes of *H. cordata* are used as vegetable, condiments and spices either cooked or raw (Chanda and Nair, 2006) and the roots of *H. cordata* are usually used as vegetables while the dry leaves are mainly used to prepare drink by boiling decoction in southern China (Lu et al., 2006). The herb is used as folk medicine as it possess anti-viral, anti-bacterial, immune-stimulant, diuretic, anti-cancer and anti-inflammatory effects (Yoshino et al., 2005).

According to John K. Chen (2001), *H. cordata* is acrid, slightly cold in nature which enter Lung meridian. Traditionally, it is used for clearing heat and eliminate toxin in which it is normally used to treat various lung infections, lung abscess with coughing or vomiting with mucus and blood. *H. cordata* also can be used both internally and topically to treat sores and skin lesions caused by heat and toxins. Besides, it can promote urination to treat urinary tract infection (UTI) through drains "Heat" and "Dampness" from the "Lower Burner" to promote normal urination and relieve dysuria, UTI with frequent urinary urges and scanty yellow urine.

Till now, there are no scientific research has done on the investigation of the effectiveness of anti-bacterial effect of methanolic and ethanolic extraction of HCT. Further scientific research is important to discover whether methanol or ethanol is the better solvent for extraction of *H. cordata* and their anti-bacterial effect against selected bacterias. This study is to further investigate the optimum concentration of *H. cordata* Thunb. against the selected bacteria and compare the effectiveness of