# COMPARISON OF ANTIMICROBIAL ACTIVITY BETWEEN ETHANOL AND ETHYL ACETATE EXTRACTS OF *Zingiber zerumbet* RHIZOME AGAINST SKIN MICROOGRANISMS.

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# ABSTRACT

*Zingiber zerumbet* is another ginger species where its rhizome part plays the most important role in medicine. Rhizome of *Zingiber zerumbet* (ZZR) was known to have antimicrobial effect traditionally and pharmaceutically. Various researches had been done to discover the potential of this plant rhizome since decades ago. Recently, Triclosan was becoming a big issue where the compound was revealed not to bring extra benefits on health but rather might be a negative impact both on health and environment. Besides, Triclosan also caused microorganisms including skin microorganism to develop resistant against many antibacterial agent and antibiotics. In this research study, antibacterial activity of the plant rhizome was further studied against skin microorganisms. Solvent extraction with maceration technique was a method of choice. The plant rhizome was extracted by using two different solvents which are 95% Ethanol and Ethyl acetate. Both extracts were made into 1000mg/ml concentration and was tested for Antimicrobial Susceptibility Testing (AST) and Minimal Inhibitory Concentration (MIC) as well as preliminary phytochemical testing. This study was aimed to determine and to compare the antibacterial activity of *Zingiber zerumbet* rhizome from the two different extracts against selected skin microorganisms which are *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Proteus mirabilis* and *Pseudomonas aeruginosa*. Results showed that both extracts have antimicrobial activity against both gram positive organisms tested. Gram negative organisms tested showed resistancy towards 1000mg/ml ethanol extract while Ethyl acetate extract could only inhibit *Proteus mirabilis* at ZOI = 7.3 mm diameter. Both of AST and MIC testing results in this study revealed that Ethyl acetate extract has a better inhibitory effect against selected skin microorganisms compared to Ethanol extract of ZZR. MIC of Ethanol extract showed higher range of concentration needed to inhibit the organisms [(62.5-125 µg/ml) compared to ethyl acetate extract (2.0 - 31.5 µg/ml)]. In conclusion, both extracts especially Ethyl acetate extract of ZZR have potential in replacing Triclosan as antibacterial agent in skin products and other consumer products. The rhizome of the plant should not be left out and ignored as it might have more potential in the microorganism inhibitory effects.

# CHAPTER 1

# INTRODUCTION

## 1.1 Background of study

*Zingiber zeumbet (ZZ)* plant or locally known as 'Lempoyang' is a medicinal potential plant that belongs to the family of Zingiberacea. (Vishwanatha *et al.,* 2012). It is also known as bitter ginger or wild ginger by the natives. ZZ is cultivated and distributed through out the tropics area (Habsah *et al*., 2000) especially in the Southeast Asia and also in Korea, India and Bangladesh. Therefore, there are different names of ZZ such as 'Bon Adha' (Bangladesh), 'Hiao Dam' (Northern Thailand), 'Hong Qiu Jiang' (China), 'Ghatian' or 'Yaiimu' (India) (Kader *et al*., 2011). Zingiber zerumbet rhizome (ZZR) is the root part of the plant which has many benefits that has been discussed.

Traditionally, Zingiber Zerumbet rhizome (ZZR) is used to treat fever, constipation, pain reliever, cure for swelling, lost apetite sore throat etc. (Burkill & Birtwistle, 2002). Depending on how it is prepared, for example the juice of boiled ZZR is used to treat worm infestation in children (Ruslay *et al*., 2007). In pharmaceutical view, ZZR has many medicinal potential such as anti-inflammatory activity (Chien *et al*., 2008), anti-pyretic and anelgesic activity (Somchit *et al.,* 2005), anti-helmentic activity (Goswami *et al.*, 2011), cytotoxic agent (Hossain *et al*., 2012) and anti-microbial activity (Vishwanatha *et al.,* 2012). There are several journals reported on antimicrobial activity of ZZR extracts. ZZR extract has been reported to have anti-bacterial against *Staphylococcus aureus, Vibrio hemolyticus, Escherichia coli, Salmonella typhi, Pseudomonas aeruginosa* etc. and anti-fungal against *Aspergillus spp*., and *Candida albicans* (Kader *et al.*, 2011 and Vishwanatha *et al*., 2012). There are various antimicrobial compounds that could be isolated from ZZR. Sesquiterpene and zederone has been isolated from ZZR and it showed anti-bacterial activity towards five difference *Staphylococcus aureus strains* (SA1199B, ATCC25923, XU212, RN4220 and EMRSA15) with minimal inhibitory concentration of 64–128 µg/ml (Kader *et al*., 2010).