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ANTIMICROBIAL AND ANTIOXIDANT ACTIVITIES OF LEAVES AND ROOTS OF *Centella asiatica*

By

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DECLARATION

I declare that the work in the thesis was carried out in accordance to the regulation of Universiti Teknologi MARA (UiTM). It is original and the result obtained is from my own work, unless indicated or acknowledged as referred work. This thesis has not been submitted to any other academic or non-academic institutions for any other degree or qualification.

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ABSTRACT

Antimicrobial and Antioxidant Activities of Leaves and Roots of *Centella asiatica*

Centella asiatica (*C. asiatica)* or locally named as 'pegaga' in Malaysia, belongs to the family Umbelliferare . It is known to have many medicinal benefits and all parts of this plant can be utilized for medicinal used. This study was conducted to determine the antimicrobial and antioxidant activities of the leaves and roots of *Centella asiatica.* The plant was disintegrated to two part which were leaves and roots and extracted in ethanol for antimicrobial activities against *Staphylococcus aureus* (ATCC 25923) and methanol extraction for antioxidant activities. The minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) of *Centella asiatica* leaves and roots extract were determined by broth dilution method against *Staphylococcus aureus* (ATCC 25923). Antimicrobial sensitivity testing also done using five different concentration of the extract which were 500 mg/ml, 250 mg/ml, 150 mg/ml, 75 mg/ml and 37.5 mg/ml and the antioxidant activities of *C.asiatica* leaves and roots extract were determined by DPPH radical scavenging assay. The *C.asiatica* leaves and roots extract showed MIC and MBC value at concentration of 150 mg/ml. For antimicrobial sensitivity testing the zone of inhibition of the *C.asiatica* leaves extract was greater than *C.asiatica* roots extract. The leave extract gave zone of inhibition range about 10 mm to12 mm at the concentration of 500 mg/ml and 8 mm to 10 mm at the concentration of 250 mg/ml. There were no zone of inhibition observed on the leave extract at the concentration of 150, 75, 37.5 and mg/ml. The roots extract of the *C.asiatica* only showed the zone of inhibition at the concentration of 500 mg/ml range about 8 mm to 10 mm. There were no zone of inhibition observed on the roots extract at the concentration of 250, 150, 75 and 37.5 mg/ml. The positive control (Gentamicin 30µg) showed zone of inhibition in the range 25 to 30 mm. Percentage of inhibition of DPPH radical scavenging activity by methanolic leaves extract of *C.asiatica* showed higher value which were 38.53% for 1.25 mg/ml, 30.35% for 2.5 mg/ml, 84.55% for 5 mg/ml, 85.16% for 10 mg/ml and 86.47% for 20 mg/ml while the methanolic roots extract of *C.asiatica* were 10.38% for 1.25 mg/ml, 4.35% for 2.5 mg/ml, 14.52% for 5 mg/ml, 62.26% for 10 mg/ml and 79.32% for 20 mg/ml. In conclusion, the *Centella asiatica* leaves extract showed greater antimicrobial and antioxidant activities compared with the roots. In vivo study is highly recommended for further study.

Keywords: *Centella asiatica,* antimicrobial activity, antioxidant activity

CHAPTER 1
INTRODUCTION

1.1 Introduction

Centella asiatica (*C.asiatica*) or locally named as 'pegaga' in Malaysia , is a small herb that is aromatic and belongs to the family of Umbelliferare. It is well known as 'Brahmi' in India and is a useful medicinal plant that is used as an antiaging agent (NS Jagtap et al., 2009). It is also known as Indian Pennywort or Marshy Pennywort in USA, Pohekula in Hawaii, Kapikapu in Cook Islands, Totodro in Fiji, Fo-ti-tieng,Chi-hsueuh-tsao in China, Tono in Samoa,Tonga and Tohatupou in Tahiti (Kanchan Joshi and Preeti Chaturvedi, 2013). *C.asiatica* has been widely used as traditional medicine for hundreds of years in treatment of various disease for examples to treat skin diseases, heal wounds, for revitalizing the nerves and brain cells and is a well known 'Brain food ' in India (Seevaratnam et al.,2012). It is also functional as useful drug to treat ulcer, depression and reduce the venomous toxicity. Besides that, it improves general behaviour and mental ability of the retarded children (Suresh Kumar and Anil Sharma, 2014).

C.asiatica is reviewed to posses large amounts of antioxidants due to its phenolic compounds (Kannabiran, 2009). The biological active compounds of *C.asiatica* are triterpenes saponins which play an important task in nutraceutical and medicinal fields. The triterpenes of *C.asitica* consist of many compounds, the most important active compound being asiatic acid, madecassic acid, asiaticosside and madecassoside (Puziah Hashim et al., 2011). Antioxidants are the component that reduce damaging effects of reactive oxygen species and decrease the risk of oxidative stress diseases related (Meena et al.,2012).