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**EFFECTS OF EXTRACTION TEMPERATURES ON TOTAL FLAVONOID
CONTENT AND ANTIOXIDANT ACTIVITY OF *Piper sarmentosum* Roxb.
(KADUK)**

By

NOR FADILAH BINTI RASULI

**Thesis Submitted in Partial Fulfillment of The Requirement for
Bachelor of Medical Laboratory Technology (Hons), Faculty of Health Science,
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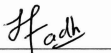
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DECLARATION

I hereby declare that this thesis is my original work and has not been submitted previously or currently for any other degree at UiTM or any other institutions.

Name : Nor Fadilah binti Rasuli
Student's ID No : 2011610826
Programme : Bachelor in Medical Laboratory Technology (Hons)
Faculty : Health Sciences, Puncak Alam Campus, UiTM
Title of Thesis : Effects of extraction temperatures on total flavonoid content and antioxidant activity of *Piper sarmentosum* Roxb. (Kaduk)

Signature of student:



Date

: July 2015

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ABSTRACT

Piper sarmentosum Roxb. or “Kaduk”, is one of potential herb to treat chronic diseases. It is traditionally consumed as drink and carminative as it contains various bioactive compounds with antioxidant activity. The yield of antioxidant compound from plants is influenced by several parameters including temperature, pH and solvent during nourishment or beverage process preparation. To date, there is no information regarding the effect of heat treatment on antioxidant content and activity of *Piper sarmentosum* Roxb. leaf. The present study evaluates the effect of different extraction temperatures on the total flavonoid content (TFC) of *Piper sarmentosum* Roxb. leaf and their corresponding antioxidant scavenging activities. Colorimetric aluminium chloride assay were used to measure the TFC of *Piper sarmentosum* Roxb. leaf extracts at temperature 30°C, 40°C, 50°C, 60°C, 70°C, 80°C, 90°C and 100°C. The antioxidant free radical-scavenging activity was measured using 2,2-diphenyl-1-picrylhydrazyl (DPPH) assay. TFC of *Piper sarmentosum* Roxb. was significantly elevated with increasing of extraction temperature ($p < 0.05$) starting from 8.54 until 22.61mgQE. In addition, increase extraction temperature also significantly increase antioxidant free scavenging activity of *Piper sarmentosum* Roxb from 42.39 until 89.76% compared to unheated *Piper sarmentosum* Roxb. extract, 24.3%. TFC (0.02mg/ml) content were highly correlated with DPPH free radical scavenging activities ($R^2 = 0.866$) and is influenced by extraction temperature. In conclusion, extraction temperature significantly influence the antioxidant content and activities as the highest level of TFC and antioxidant scavenging activity observed when *P. sarmentosum* Roxb leaves heated at 100°C.

CHAPTER 1

INTRODUCTION

1.1 Background of study

Oxidative stress is a condition that emerges due to imbalanced generation of free radicals during biological processes, where the level of these compounds exceeds antioxidant scavenging capacity (Amira, 2010). Free radicals are unstable molecules due to the presence of one or more unpaired electrons on their outer orbital. Thus they tend to react with other molecules to generate more stable species through process of receiving or releasing electrons (Gueteens et al., 2002). In 2002, Gueteens et al. noted that high oxidative stress damages proteins, lipids, DNA and other molecules which lead to many pathological conditions such as heart disease, neurodegenerative disease, cancers, cataract and diabetes. However, these oxidative stresses can be scavenged or inhibited by the activity of antioxidants.

Antioxidants are any substances that delay or prevent oxidation to protect and defend living cells against oxidative damage. Antioxidative defense mechanisms are grouped into enzymatic and non-enzymatic systems. Two sources of exogenous antioxidants are synthetic and natural antioxidants. Usage of synthetic antioxidant are under strict regulation as they are potentially hazardous to health and may cause side effects *in vivo* (Sudha et al., 2011). Therefore, current researches are focused on antioxidants from natural products such as plant, sea food and marine organisms. For instance, plant species have gained attention among researchers who seek to discover antioxidant which are mostly found in all parts plants (Hamid et al., 2010).

Piper sarmentosum Roxb. (*P.sarmentosum*) is a potential source of natural antioxidant where it has been traditionally used to treat asthma, enhancing appetite and to treat diabetes mellitus. Hafizah et al. (2010) reported that ethanolic extract of *P.sarmentosum* Roxb. demonstrated antioxidant activity against oxidative stress caused by hydrogen peroxide. Phytochemically, *P.sarmentosum* Roxb. leaves contain vitamin C, tannin,