

UNIVERSITI TEKNOLOGI MARA

**EXTRACTION OF POLYPHENOLS
FROM CLINACANTHUS NUTANS
LINDAU MEDICINAL PLANT USING
SOLVENT-FREE MICROWAVE
EXTRACTION (SFME)**

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ABSTRACT

In general, this research is about the extraction of polyphenols from *Clinacanthus nutans* Lindau (*C. nutans*) which used Solvent-Free Microwave Extraction (SFME). In Malaysia, *C. nutans* is well-known with their high polyphenols content and medicinal purposes in traditional treatment such as fever, snake bites, anti-herpes, anti-inflammatory properties and etc. In previous extraction, conventional methods have been used to extract the polyphenols content such as maceration and soxhlet extraction which consumed a longer time and high amount of solvent which may toxic or poison the polyphenols content. Therefore, several methods have been introduced to reduce the consumption of solvent and extraction time which are Supercritical Fluid Extraction (SFE) and Microwave-Assisted Extraction (MAE). However, this method still used solvent to extract. Thus, Solvent-Free Microwave Extraction is conducted to extract which the extraction is without consumed any solvent or water. The extracts are analysed by Folin-Ciocalteu colorimetric method and aided by UV-Vis Spectrometer in order to achieve one of the objectives which is to determine the total phenols content (TPC). Furthermore the effect on extraction is investigated: microwave power and extraction time. In order to explain more the efficiency in extraction of the polyphenol content, extraction temperature and energy absorbed during the exposure to the microwave radiation have been studied and analysed. Among the results, the best result which indicated higher total phenol content extracted by SFME which used microwave power, 240 W and extraction time, 1 min, is 1.4610 mg GAE/g DS with energy absorbed, 0.90 kJ. The polyphenols yield is depended on the microwave power and extraction time as well as extraction temperature and energy absorbed. The higher microwave power and longer extraction time may lead to the degradation of polyphenols due to high extraction temperature.

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND STUDY

Clinacanthus Nutans Lindau is one of the family 'Acanthaceae'. It is basically a small shrub that native to tropical Asia countries. The name of Sabah Snake Grass or 'Belalai Gajah' is well known in Malaysia for *C. nutans*. [1]. In Malaysia and Thailand, this plant has been used as a remedy for bites and stings which is from snake, skin rashes, herpes simplex virus (HSV) and varicella-zoster virus (VZV) lesions [2, 3]. Moreover, the leaves of *C. nutans* also possesses anti-hepatitis, anti-herpes, and anti-inflammatory properties. Thus, it is can be used as prevention and treatment on the cancer [4-6]. In Thailand the *C. nutans* is classified as principal medicinal plant for primary healthcare by the Thai Ministry of Public Health (National Drug and Committee, 2006). The extensive research is being conducted on the *C. nutans* for its medicinal properties [4]. In recent years, the *C. nutans* has attracted many people interest due to their properties which is properties for cancer treatment. Due to their alleged properties in cancer treatment have been attracted the researchers to further study on it [5].

In previous phytochemicals studies, the *C. nutans* show the present of a series of polyphenols, flavonoids, stigmasterol, β -sitosterol, lupeol, betulin, C-glycosyl flavones, vitexin, isovitexin, shaftoside, isomollupentin, 7-O- β -gluco pyranoside, orientin, isoorientin, cerebrosides monoacylmonogalactosylglycerol and sulfur-containing glucosides [7-9]. Furthermore, among these phytochemicals, the antiviral and anti-HSV activity are significantly shown by glycolipids and digalactosyl diglycerides [10]. Not just that, polyphenols is well-known with their properties as antioxidants, anti-inflammatory, anti-allergic, and ant carcinogenic activity, and the quality and value of food can be improved by these properties as mentioned by Liu, 2004 [11]. In order to extract the polyphenols in the *C. nutans*, various methods of extraction have been done to study the polyphenols. Moreover, each of the methods have different efficiency to extract. In which, there are parameters that affect the