

CHAPTER I

INTRODUCTION

1.1. Introduction

Plants have been used for several centuries to treat many human diseases due to their medicinal properties. Their preferable usage is not only due to their biological effects, but also due to their natural source, low cost, effectiveness, and minor side effect (De et al., 2013a; Modak et al., 2007; Nostro et al., 2000; Siriwatanametanon et al., 2010). The variation of secondary metabolites in the plants in form of bioactive compounds give effect of remarkable biological activities (Azmir et al., 2013; Bandar et al., 2013 ; Bernhoft, 2010).

In recent times, the dominance of medicinal plants or traditional medicine over modern medications has been normally accepted amongst our civilization. This can be seen based on the growth of the pharmaceutical production every year. Further, there is a rise in the demand of the natural products to be used as health supplements and cosmetics by consumers. Scientific studies are very significant to consider the side effects, which could be caused due to natural products usage. Issues concerning the values, nontoxic dosage, and appropriate application are need to be taken into account to avoid any over expectation and abuse (Yusoff, 2006).

Plants have been demonstrated to possess several medicinal properties are deliberated as pharmaceutical products and studies have been performed to investigate the products and their properties including toxicology, interactions, medical and therapy applications (Yusoff, 2006).

Malaysia and several Asian countries are awarded with greatly different biological flora and fauna, which possess nutritional and medicinal values that need to be scientifically.

Clinacanthus nutans is the scientific name of a plant called Belalai Gajah or Sabah Snake Grass in Malaysia. It belongs to Acanthaceae family and is used in Malaysian society as an anti-herpes agent and anti-hepatitis (Jr-Shiuan et al., 2012).

Several studies have indicated that herbs with anti-oxidant effects could possess substances that have anti-cancer properties; In addition there is a positive relationship between anticancer effects and antioxidant activity (Li et al., 2007; Umadevi et al., 2013). It has been observed that *Clinacanthus nutans* has antioxidant and anti-proliferative characteristics against cultured cancer cell indicating a substitute adjunctive treatment for cancer prevention (Yong et al., 2013a).

The qualitative and quantitative studies of bioactive substances from plant materials are highly depend on the selection of appropriate extraction technique since it is the first stage of any medicinal plant study and would affect the significant results and outcomes (Azmir et al., 2013; Sasidharan et al., 2011; Smith, 2003).

In addition, solvents are important issues, which should be taken into consideration to extract the bioactive compounds from the plant due to their polarity effects. Which means the right solvent selection will determine the absorptions of hydrophilic or lipophilic components from the plants. For instance, polar solvents are only able to extract hydrophilic substances, while semi polar solvents can absorb hydrophilic and lipophilic compounds. However, non-polar solvents can extract only lipophilic compounds. Plant

extraction using different solvents could elevate the possibilities to extract a wide range of components (Shah et al., 2011).

Spectrometric and chromatographic are useful techniques to analyze the bioactive compounds in crude plant extracts with possibly valuable properties to be utilized for additional chemical and pharmacological studies (Meena et al., 2014; Poole et al., 1990). However, there are not many studies have been carried out on the usage of GC-MS to investigate different *Clinacanthus nutans* extracted by using mixture of different solvents.

1.2. Problem Statement

Most of the current therapies are based on synthetic drugs and these have always been found to have side effect on the patients. *Clinacanthus nutans* has been known as medicinal plant in tropical countries like Malaysia. Recently, the researchers showed that *Clinacanthus nutans* has an anticancer activity. It is therefore paramount to evaluate the better solvents to extracts the compounds present in this plant and identify them.

1.3. The Aim of The Study

The aims of this study were as follow:

- 1) To evaluate the ability of different mixture of solvents to extract the bioactive compounds from *Clinacanthus nutans* using GC-MS identification for the compounds.
- 2) To test the extracts on murine colon 38 carcinoma cell line.

1.4. Scope of Study

The scope of study covers three common solvents (chloroform, hexane, and methanol), local *Clinacanthus nutans* leaves and murine colon cancer cells.