

1.0 Introduction

1.1 General introduction

Reactive oxygen species (ROS) is a highly reactive molecule which contains radical oxygen atoms in the formation of the molecule. ROS can be generated in our body through cellular metabolic processes and/or exposure to ultraviolet radiation (UV) and chemicals such as nitrosamines, dioxins and aldehydes. Accumulation of ROS will affect our normal physiological functions. At this point, the presence of antioxidants is crucial to overcome the adverse effects of ROS. Antioxidants can be either obtained from our diet (exogenous antioxidants) or produced in our body (endogenous antioxidants). When the ROS level overcomes the antioxidant level in our body, it will lead our body into a state of oxidative stress. Oxidative stress is a general term used to describe the level of oxidative damage in the body caused by ROS. This condition may contribute to the development of several pathological conditions such as inflammation, carcinogenesis, neurodegenerative diseases and atherosclerosis. Even though there are synthetic antioxidants available, they are volatile, easily decomposed and possess toxic effects. Therefore, the search of antioxidants from natural products becomes an important endeavor. This is particularly true for Malaysia as she has an abundant resource of natural products.

In terms of terminal disease, cancer is not the number one killer in this world. However, it causes a lot of physical and emotional pain to both the patients and their families. Cancer is a group of diseases characterized by uncontrolled growth and spread of abnormal cells. The accumulation of oxidative stress through both internal (mutation, hormones, inherited, immune conditions) and external (chemicals, radiation) factors will initiate the formation of cancer. Currently, cancer can be treated through surgery, chemotherapy, hormone therapy, and/or biological therapy. Although effective, these

treatments will affect the patients' quality of life. Thus, there is a need for more advanced technology such as gene therapy to be developed and improve what we have at the moment. Currently, there is a growing concern regarding health and adverse effect of modern drugs. Thus, more people prefer organic food and choose to practice a healthier lifestyle. This demand triggers high interest towards natural product industry as well as the research on potential natural-based drugs for cancer treatment. Drugs which obtained naturally might work faster, safer and more specific towards the cancer cells compared to the drugs available at the moment.

Ficus deltoidea, known as Mas Cotek by the Malays is a shrub herb from the Moraceae family. It has been traditionally used to improve blood circulation, regulate blood sugar level and to aid in recovery after giving birth. Even though *F. deltoidea* has been proven to contain flavonoids, tannins, triterpenoids, proanthocyanins and phenols which act as antioxidant and anti-inflammatory agents, the scientific data available in support of these claims are still very limited. Therefore, detailed studies on the antioxidant and anticancer properties of *F. deltoidea* would be an interesting area to be explored.

1.2 Objectives

This study is performed to fulfill the following objectives:

- To screen *F. deltoidea* extract for potential antioxidant and anticancer agents.
- To determine the levels of exogenous antioxidants through total phenolic content, 1,1-diphenyl-2-picrylhydrazyl (DPPH) and lipid peroxidation assays
- To investigate the cytotoxic effects of the extracts or fractions towards several types of cell lines by using MTT assay
- To elucidate the endogenous antioxidants through catalase, glutathione peroxidase and superoxide dismutase assays
- To determine the mechanism of cell death by performing DNA fragmentation assay
- To develop and compare protein profiles of treated and untreated cell lines.
- To identify and validate the deregulated proteins or peptides.