

CHAPTER 1

INTRODUCTION

1.1 Research Background

Cancer is a group of diseases involving abnormal cell growth with the potential to invade or spread to other parts of the body. Many treatment options for cancer exist, with the primary ones being surgery, chemotherapy, radiation therapy, hormonal therapy, targeted therapy and palliative care. Most of these treatments are painful and may cause side-effects in the human body and are also very expensive.

Banana being one of the most widely used fruits for consumption which is available in abundant quantities at low costs is said to have certain antioxidant and anticancer properties. The peel of banana is also said to have been useful in treatment of acne, warts, teeth whitening, water filtration, scraps, scratches, rashes and itches, etc.

According to National Cancer Standard Institute banana peel extract is described as non toxic to normal human cells, so it can be used as a natural source of antioxidants

Banana peel recorded stronger antioxidant activity, pooled more quantity of phenolic compounds, greater range of phenolics composition and higher in minerals content than banana pulp. Banana pulp had been reported as having various antioxidants such as vitamins (A, B and E), β – carotene and phenolic compounds like catechin, epicatechin, lignin, tannin, galocatechin and anthocyanins like peonidin and malvidine.

There several type of antioxidant such as vitamin C, E, A, beta-carotene, lycopene and also other substances. Antioxidants are abundant in fruits and vegetables, as well as in nuts, grains, and some meats, and fish. Combination of vitamin C with other antioxidants, including vitamin E, b-carotene, and selenium, provides a synergistic antihypertensive effect. Experimental evidences prove that antioxidants can protect human body from free radicals and reactive oxygen species (ROS) effects.

Antioxidants are substances that can prevent or slow the oxidative damage process toward our body. Besides, antioxidant also protects cells from the damage that may cause by free radicals. Free radicals are unstable molecules or highly reactive chemical that often contains oxygen and is produced during oxidation. The defensive effect of natural

antioxidant in fruit and vegetable are related to its major group, which are vitamin, phenolic and carotenoid.

Ascorbic acid and phenolic and are known as the hydrophilic antioxidant while carotenoid was known as lipophilic antioxidant. Exposure to various environmental factors will lead to free radical formation such as tobacco smoke and radiation. Free radicals can damage important cellular molecules such as DNA or lipids or other parts of the cell and may lead to cancer.

Banana peel also demonstrated the presence of various phenolic compounds such as galocatechin and anthocyanins like peonidin and malvidin. Phenolic compounds are secondary metabolites, which have been associated with flavour and colour characteristics of fruits and vegetables and are gaining considerable attention because of their potent antioxidant and health promoting properties. Extraction of phenolic compounds in plant materials is influenced by many factors including the extraction method employed, types of solvent polarity used, storage time, and presence of interfering substances, sample particle size and conditions as well as their chemical nature.

Bananas were enriched with minerals like potassium, phosphorus, magnesium and calcium. Banana peel could be a good source of carbohydrates and fiber. The high fiber content also indicates that the peels could help treat constipation and improve general health and well-being.

Natural antioxidant are compound from plant or animals sources that retard oxidative rancidity of oil, fats and fat soluble components, thus protecting them while delaying the development of unpleasant flavors and odors resulting from oxidation process. Antioxidants are present naturally in most raw food sources. Processing of the fruit can remove or trigger the degradation of this antioxidant.

Nowadays, the most widely used antioxidant were synthetic antioxidant such as butylatedhydroxyanisole (BHA), butylatedhydroxytoluene (BHT), tertiary butylhydroxyanisole (TBHQ), and propyl gallate (PG).

Guduchi (*T. cordifolia*) is widely used in veterinary folk medicine/ ayurvedic system of medicine for its general tonic, antiperiodic, anti-spasmodic, anti-inflammatory, anti-arthritic, anti-allergic and anti-diabetic properties. The plant is used in ayurvedic, "Rasayanas" to improve the immune system and the body resistance against infections. The

root of this plant is known for its antistress, anti-leprotic and anti-malarial activities Authors investigated earlier one of the plants of the family Menispermaceae and found that the constituents and activities were similar to other reports.

1.2 Problem Statement

Natural antioxidant particularly found in fruit and vegetables have gain interest among consumer and the scientific community because epidemiological studies have indicate that frequent consumption of natural antioxidant is associate with the lower risk of cardiovascular and cancer. Natural antioxidants are perceived safe, less toxic and beneficial for human health.

However, natural antioxidant is very expensive and has been not widely commercialized. Recently, the demand for natural antioxidants has increased, due to consumer concerns about the safety of synthetic antioxidants .There had been an explosive interest in studying antioxidants of some fruits due to their health promoting properties. Also its association with cancer can be used as an alternative medicine to recent therapies which have side effects.

1.2 Objectives

The main objective of this project was to establish the optimal conditions for obtaining the banana peel (*Musa paradisiaca*) extract for antioxidant and anticancer properties and compare the results with that of *Tinospora cordifolia* stem for the same.

- Optimising conditions like drying techniques, types of solvents, type of extraction and concentration)
- Antioxidant testing and total polyphenol determination
- Comparison of the two species
- Analysis by GC-MS

1.3 Significance

Banana peels are waste from banana fruit and they contain high amount of antioxidant, phenolic content and mineral. This peel is biodegradable and it will produce environmental problem due to it nitrogen and phosphorus quantity. Therefore, extracting the banana peel will be the best solution in order to protect human being, gaining some profit and creating waste to wealth. Banana peel also can be commercialize because it qualitative and quantitatively contain

more antioxidant than it pulp. It also will have does not compete with banana pulp in producing end product especially in the food industry. Recent studies have shown the anticancer properties by banana peel hence its use can can suffice as an alternative medicine for cancer.

T.cordifolia is a well-known ayurvedic plant, shows high amounts of antioxidant and Immunomodulatory activities and is therefore taken as comparison with banana peel.