

## CHAPTER I



## INTRODUCTION

Due to versatile health promoting effects, nowadays, worldwide attention is focussed on phytochemicals, which is the naturally occurring plant material. Human concern with health benefits as first priority tends to replace the synthetic materials with the natural one. With the increasing popularity of natural substances as an alternative to synthetic one for disease treatments, much interest has risen over the phytochemicals. Among these, the focal point of interest is centered on the plant polyphenols and its antioxidant activities.

In the biological system, the deficiency of natural antioxidant defences lead to the imbalance of oxidant and antioxidant activity which in terms lead to the massive accumulation of free radicals. These free radicals have been implicated in many pathological disorders including cancer. Under these circumstances, the use of antioxidant supplement has played an important role to decrease the unintentional effects of free radicals. Fortunately, numerous traditional herbal plants, which have been established and are believed to reduce the risk of several chronic diseases caused by free radicals or reactive oxygen species (ROS) and claimed to possess the strong free radical scavenging activity either acting alone or in combinations with other antioxidant (Bidlack *et al.*, 2001). Moreover, the search for cheap, renewable and abundant sources of antioxidant compound is attracting world wide interest (Moure *et al.*, 2001).

Recently, the growing interest in the potential health benefits of green tea, together with its popularity as a beverage have prompted a large number of investigations on their chemical composition and biological activities. Green tea comes from plant *Camellia sinensis* (family Theaceae) which is native to Asian countries. Ideal environmental conditions for tea plantations exist in these areas. According to the traditional belief, green tea has been used since ancient times and one of the most widely consumed and best loved beverages, next to water

especially in Asian countries (Agarwal *et al.*, 1992). Moreover, green tea is nontoxic and readily available to the general population (Imai *et al.*, 1997).

Numerous epidemiological surveys and experimental studies have shown an inverse relationship between the consumption of green tea and the incidence of cardiovascular disease and cancers (Lin *et al.*, 2000). A growing amount of research has demonstrated that green tea polyphenols has powerful antioxidants with anticarcinogenic properties (Brown, 1999), antibacterial properties (Caturla *et al.*, 2003) and antiviral properties (Weber *et al.*, 2003). Obviously all these protective activity of green tea are partly related to the powerful radical scavenging and antioxidant activity.

Cancer is the leading cause of death in many countries (Imai *et al.*, 1997) and it is dubbed the killer disease. One of the most common type of cancer is skin cancer, especially due to depletion of ozone layer, large amounts of UV radiation reach the earth's surface and stimulate the production of reactive oxygen species (ROS) in the cells and skin which cause DNA damage leading to abnormal cell proliferation (Stratton *et al.*, 2000). The incidence of skin cancer has been rising in recent years with significant effect on public health (Einspahr *et al.*, 2002). Of the two types of skin cancer, melanoma skin cancer poses an enormous medical challenge. It still remains a highly lethal disease and the incidence of melanoma continues to increase faster than any other cancer (Pawlik *et al.*, 2003). Indeed, primary prevention has proven inadequate in combating the incidence of skin cancer, thus stimulating the development of chemopreventive strategies for skin cancer. In recent years, many studies demonstrated that topical application or oral feeding of polyphenolic fraction from green tea extracts and its individual catechin derivatives, had anticarcinogenic effect in animal skin experiments (Katiyar *et al.*, 2001).

All these salient points of green tea are attributed to the rich source of green tea polyphenol, in particular epigallocatechin gallate. However, the composition of green tea depends on many factors such as environmental condition, horticulture practices, choice of harvesting time, the species and the

age of the leaf (Lin *et al.*, 2000). Moreover, different parts of the world in which different races reside have differ in their tea processing methods and drinking styles. Considering the widespread reports of green tea globally accepted as medicinal herbs due to its remarkable health benefit in both antioxidant and anticarcinogenic activities, thus recognising the need to review and evaluate other Asian green teas, firstly based on *in vitro* experimental studies. So far few attempts have been made to prove the effectiveness of other Asian green tea, for instance Myanmar and Thai green tea.

This study was focused on green tea grown in three different Asian countries Japan, Myanmar and Thailand. The main objectives are to evaluate the green teas from those three different regions in terms of antioxidant activities and cytotoxicity. “Shincha Ohashiri” brand for Japanese green tea (JGT), “Pinsali” brand for Myanmar green tea (MGT) and “Choicest tea” brand for Thai green tea (TGT) were chosen as they are the brands available on the market having a good reputation. This study will help us to understand whether all the green teas from different sources have similar antioxidant and anticarcinogenic activity or any one of them has superiority over the other.

Specific aims of this study were:

- (1) To extract the green tea polyphenols from dried green tea leaves of three different origins (Japan, Myanmar and Thailand).
- (2) To analyze the total polyphenol contents in each of the three different green tea extracts by using High Performance Liquid Chromatography (HPLC) assay.
- (3) To screen for the radical scavenging activity of each green tea extracts by using the stable 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical and by comparing with the well-known antioxidant butylated hydroxytoluene (BHT).
- (4) To determine and compare the total antioxidant activity of each green tea extract.
- (5) To compare the cytotoxicity of each of the three green tea extracts to inhibit the growth of melanoma cell line.