CHAPTER 1

INTRODUCTION

Tea is one of the most widely consumed beverages in the world, next only to water (1,2) and well ahead of coffee, beer, wine and carbonated soft drinks (3). It can be categorized into three types, depending on the level of fermentation, i.e. green (unfermented), oolong (partially fermented) and black (fermented) tea. The term fermentation is often used incorrectly in tea processing. The more correct term should be oxidation, which means exposure to air while drying without any additives during the process. Another form of tea is white tea which is made from new growth buds and young leaves that have been steamed to inactivate polyphenol oxidation and then dried. There is hardly any other food or drink reported to have as many health benefits as green tea. (4)

The chemical composition of green tea varies with climate, season, horticultural practices and position of the leaf on the harvested shoot. The major components of interest are the polyphenols. The major polyphenols in green tea are flavonoids. The four major flavonoids in green tea are the catechins, epicatechin (EC), epigallocatechin (EGC), epicatechingallate (ECG) and epigallocatechin gallate (EGCG). (5,6)
Epigallocatechingallate is viewed as the most significant active component. The leaf bud and first leaves are richest in EGCG. The usual concentration of total poly phenols in dried green tea leaves is 8–12%. Other compounds of interest in dried green tea leaves include gallic acid, quercetin, kaempferol, myricetin, caffeic acid and chlorogenic acid.(5,7)

Various health benefits can be attributed to consumption of green tea since the beginning of its history.(11) In vitro and animal studies, and clinical trials provide strong evidence that green tea polyphenols (GTP) may have a significant role in the pathogenesis of several chronic diseases such as cardiovascular disease and cancer. In addition, various other studies have suggested a beneficial effect of green tea on bone density, cognitive function, dental caries and kidney stones, among other effects.(8,11)

Other epidemiological studies have shown several physiological responses to green tea which may be relevant to the promotion of health and the prevention or treatment of some chronic diseases. Conflicting results may arise between human studies from ignoring socioeconomic and lifestyle factors as well as by inadequate methodology to define tea preparation and intake. (8,9,10,11)
Oral diseases including dental caries, periodontal disease, and tooth loss may significantly impact a person’s overall health. Among these, dental caries is a multifactorial infectious disease in which nutrition, microbiological infection, and host response play important roles. (12)

With respect to the effect of tea extracts on dental caries, green tea has been reported to contain substances, notably polyphenols, that have antibacterial properties against oral pathogens, such as Streptococcus mutans, the bacteria closely associated with dental caries. (13,14) Some studies suggested that a diet supplemented with green tea may beneficial in dental caries management. (13) Lingstrom et al (15) found that frequent mouth rinsing with black tea infusion may contribute to oral health by inhibition of plaque, its acidity and its cariogenic microflora. Green tea and coffee contain varying amounts of fluoride. (16,17) It has been suggested that the anti-caries effect observed with green tea is due primarily to the antibacterial properties of the organic components (polyphenols, tannins) rather than the cariostatic effect of fluoride. (18,19,20)

The polyphenols in green tea were reported to have an inhibitory effect on growth and cellular adherence of Porphyromonas gingivalis, an oral bacterium that
causes periodontal disease. (21) The key astringent taste compounds in green tea are catechins, theaflavins, and flavonol glycosides. Although compounds in all three categories are detected as astringent, flavonol glycosides are the most abundant contributors of astringency in black tea (22).

As the popularity of green tea continues to rise because of its beneficial effects, we as Public Health Dentists are expected to provide information to patients regarding their efficacy and safety. This has mandated the dental professionals to evaluate the effectiveness of green tea and provide evidence based suggestion to their patients to make a better choice. Thus, an attempt is being made here to evaluate the effect of intake of green tea on gingival and periodontal status.
Tea leaves (*Camellia sinensis*)

Polyphenols (catechins, principally)

Partial withering

Steaming

Rolling and drying

Final firing

Green tea

Non-oxidised phenolic compounds/ catechins

(ECGC, EGC, ECG, EC)

Indoor withering

Rolling

Total fermentation

Polyphenol oxidase action

Final firing

Black tea

Oxidised phenolic compounds/ theaflavins thearubigins

Fig.1: Principal differences between green and black tea processing and its influence on the final polyphenols content. (Ref. 12)