

BENEFITS OF GREEN TEA IN ORAL HEALTH CARE-A REVIEW

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Abstract: Green tea becomes one of the most popular beverages consumed worldwide, because of its many scientifically proven advantageous effects on human health it has gained attention in recent years . which is also rich in health-promoting flavonoids account 30% of the dry weight of a leaf, includes catechins and their derivatives. Several studies has proved that green tea catechins, such as epigallocatechin gallate, prevent growth of periodontal pathogens and decrease the destruction of periodontal tissue.

Keywords: Camellia sinesis, oral health, flavonoids, catechins.

1. INTRODUCTION

Green tea is an aqueous mixture of dried leaves of the plant *Camellia sinesis*, It is the most popular beverage consumed in the different parts of the world. [1] It contains various health promoting bioactive compounds which have been used for many centuries. It is also known as a functional food which has more positive health effects . It has antioxidant, anti-inflammatory, antimicrobial and anti-mutagenic properties [2]. Which contains variety of enzymes, amino acids, carbohydrates, lipids, sterols, related compounds, dietary minerals, and phytochemicals such as the polyphenols, flavanols, and caffeine. Polyphenols are the most important compounds of the green tea . It exist in many plants such as fruits, vegetables, teas and cocoa. It impart many health benefits like antibacterial, anticariogenic, , antiviral, antifungal and periodontitis and halitosis other biological properties; which can also related to tea's abilities on metal chelating, free radical scavenging, and antioxidant activities [1,3] . The major group of polyphenols are flavanoids. The main flavonoids in the green tea are catechins such as epicatechin, epigallocatechin (EGC), epicatechin gallate (ECG), epigallocatechin gallate (EGCG), galocatechin (GC), galocatechin gallate (GCG), catechin, and catechin gallate (CG). Besides the catechins, apigenin, apigenin-7-O-glucoside (Api-G), myricetin, kaempferol , and vitechin are also reported as green tea flavonoids [4]. Among the

polyphenol found in the green tea epigallocatechin-3-gallate which comprises up to 65% of total catechin. This catechin having a strong potential against carcinogenesis, angiogenesis and tumor metastasis [3]. However, Scholl et al. reported that green tea polyphenols can have various beneficial or adverse health effects which depends on the plasma levels of catechin [5].

2. COMPONENTS OF GREEN TEA

Four catechins present in green tea which are as follows:

1. Epicatechin gallate (ECg),
2. epicatechin,
3. epigallocatechin and
4. epigallocatechin gallate (EGCG)³

Green tea also contains:

1. carotenoids,
2. tocopherols,
3. ascorbic acid and
4. minerals like chromium, magnesium, selenium and zinc.
5. Caffeine

ANTIBACTERIAL EFFECTS OF GREEN TEA

Green tea catechins are bitter in taste. They are water soluble in nature and their biological activities affect the cell membrane functions such as signaling, cell cycle, and mitochondrial activity. Catechins have an inhibitory effects on *S. mutans* and *S. sobrinus*. Rasheed et al. indicated that the bactericidal effects of catechins on the *Escherichia coli*, *Streptococcus salivarius* and the *Streptococcus mutans*. [6] It is suggested that by the generation of hydrogen peroxide EGCG damages the cytoplasmic membrane of the bacteriae [7]. The antibacterial property of the *Camellia Sinensis* extract against the *Streptococcus mutans* and *Lactobacillus acidophilus* is also reported by Anita et al. [8]

ANTICARIOGENIC EFFECTS OF GREEN TEA

Dental enamel is comprised by hydroxyapatite crystals. The solubility of hydroxyapatite crystals rinses with decrease in pH which is harmful to the tooth enamel. [9] The EGCG extract from the green tea which causes a reduction in the acid production and also maintains pH by inhibiting the enzyme lactate dehydrogenase which is responsible for producing the lactic acid from pyruvate [10]. It also Prevents the adhesion of bacteria to the glycoprotein layer is an additional mechanism which explains the anticariogenicity. A study which has concluded that rinsing the mouth for 1 week with the green tea mouthwash significantly reduces the salivary levels of *Streptococcus mutans* and *Lactobacillus* [11]. Frequent intake of green tea helps significant decrease in the caries formation, even in the presence of sugar in the diet [12]. Extract from the green tea also helps to reduce α -amylase activity in saliva which makes it act as an anticariogenic agent [13,14]. Catechin is

found to have an inhibitory action against the *Streptococcus mutans* and *Streptococcus sorbins* in the minimal inhibitory concentration of 50-1000mg/ml[15].

EFFECTS OF GREEN TEA IN HALITOSIS

Green tea extract is effective in reducing halitosis which is caused by volatile sulfur compounds. Therefore, green tea can be a beneficial herbal ingredient in the oral hygiene products [16]. Halitosis, which is caused due to dental caries and poor oral hygiene, is attributable mainly due to volatile sulfur compounds. Few breath refreshing chewing gums and mouth spray which contain polyphenols, are the major ingredient of green tea [17]. A study has reported that by using green tea mouthwash significantly which helps to reduce the volatile sulfur components level in patients with gingivitis [18]. Another study also demonstrated that green tea extract has the ability to remove the odorant sulfur [19].

EFFECTS OF GREEN TEA IN PERIODONTITIS

Green tea catechin given by the means of local delivery system by using a hydroxypropyl cellulose strips which is said to inhibit the growth of the bacteria. Continuous application of green tea catechin was reported as an effective method for improvement of periodontitis [20]. EGCG, with its ability to inhibit the formation of osteoclasts and it also induce apoptosis cell death of the osteoclasts, it helps to improving the periodontal health [21]. Green tea which is also recognized for their roles in host defense, human gingival cells, and inflammatory response. [22,23].

ANTIVIRAL EFFECTS OF GREEN TEA

Polyphenols which act as antioxidant which inhibits the enzymes that damage the cell membrane and prevents the penetration of the virus into the cells [24]. This property of the green tea is essential as it can prevent the oral viral diseases. EGCG is said to have the ability to prevent infection from influenza virus by attaching into to viral hemagglutinin, thus it prevents the attachment to cellular target receptor [25]. A study revealed that the EGCG, EGC, and ECG was found that potent to inhibit the influenza virus by hemagglutination inhibition. EGCG and ECG suppress the viral RNA synthesis, while EGC fails to exhibit this property [26]. Green tea is also stated to have its effect against the human immunodeficiency virus type 1, herpes simplex virus, Epstein–Barr virus, and adenoviruses [24].

ANTIFUNGAL EFFECTS OF GREEN TEA

Candida albicans, a part of indigenous microbial flora in the humans, is unique among opportunistic pathogens because of it is a part of normal microbial flora of the host [27]. Candidiasis is the most common outbreak of *C. albicans* in the oral cavity. Amphotericin B (polyene antibiotics) and fluconazole (azole antifungal agent) have the strongest antifungal activity, especially against the *C. albicans*. Antimycotic-resistant isolates of *C. albicans* have appeared which act as a major drawback [28]. Hence, a crude substitute were considered necessary. A study showed synergic antifungal activity when a combination of EGC and the antimycotics was used against *C. albicans*. It is also concluded that the combined usage of EGC and the low dosage of amphotericin-B inhibited the growth of *C. albicans*, and action was proved to be fungicidal [29].

ANTIOXIDANT POTENTIAL OF GREEN TEA

Polyphenols in Green tea are the antioxidant agents and Scavengers of the free radical. [30]Antioxidants which tends to block the harmful effects of the free radicals on the body cells. catechins showing the different trends in relative antioxidant activity in different lipid

systems. Thus the study which was conducted to find out the effects of catechins on liposomes and emulsions. There was an improved antioxidant activity on liposomes than on emulsions which is explained by the greater affinity of the polar catechins toward the polar surface of the lecithin bilayers, thus affording the better protection.[31]

OTHER HEALTH BENEFITS OF GREEN TEA

Green tea having the highest content of polyphenols compared to black or oolong tea. Green tea helps to Reduces the fat absorption ,and increases the energy expendedure and plays a vital role in weight loss .It also reduces the number of cavities, LDL oxidation, and risk of heart attacks and also increases insulin sensitivity and inhibition of cancer development.[32,33].

3. CONCLUSION

Green tea plays important role to maintaining the oral health, due to the presence of polyphenols and other ingredients . Inclusion of EGCG polyphenol into oral health products and other adhesive systems is supposed to protect the soft and the hard tissues of the mouth from various oral health problems. This article stresses about the beneficial effects of the green tea over the anticariogenic, antibacterial, halitosis, antiviral, antifungal , periodontitis ,and antioxidant effects of green tea.

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