

Clinical Properties of Green Tea: Focus on Blood Lipid Profiles, Analgesia, Periodontal Status

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ABSTRACT

Nowadays, considering medicinal herbs for treating of diseases, especially the infective ones, is increasing due to their less side effects compared to the chemical drugs. Green tea is a customary drink around the world and has detoxifying and anti-oxidant properties and has been evaluated as herbal medicine. In the recent years using medicinal herbs instead of synthetic medicine has been increased due to their less side effects and variety of active ingredients in many part of worldwide. The aim of this study is to investigate some of the effects of green tea. Green tea is effective on periodontal status and reduction of tooth decay. Moreover, green tea has antioxidant, anti-inflammatory, antimutagenic, antimetastatic and anticarcinogenic activities. Tea consumption has useful effect on cancer, and in enhancing the immune function. Other considerable effect of green tea is its analgesic, antimicrobial properties and it reduces the blood lipid profiles. The authors of this paper suggest that more international investigations on variety of diseases should be conducted to evaluate some other potential effect of green tea.

Key words: Green tea, Periodontal, Analgesic, Antimicrobial

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INTRODUCTION

With regard to the detrimental effects of chemical drugs and paying exorbitant prices to prepare them, researchers are trying to find new drugs to reduce pain with less side effects than the existing ones. From the ancient times,

medicinal herbs and the medicines deriving from them were identified by human as an important therapeutic source [1,2].

Green tea is produced through drying and steaming fresh leaves and no fermentation or oxidation is performed on that. The superiority of green tea on black one is that the former contains more catechins, while in preparing black tea these simple flavanoids are turned into brown or red compounds called theaflavins and thearubigins under the

influence of oxidation that cause the brewed tea to be black [3]. The reports suggest that the green tea extract has antibacterial and antiviral activity [4,5], in addition, it is effective on recovering neurological, cardiovascular diseases and diabetes [6-8] the anti-oxidant and non-carcinogenic properties of the poly-phenols in this plant have been proved [9].

Generally, it is counted as the customary tea all around the world. Tea is obtained from drying the young leaves of the plant and distinction between all kinds of tea is related to the operations performed after picking the leaves and are introduced as the black, red, green and white tea. If the leaves are dried immediately using a dry heat, the result will be green tea. Drying in high temperature causes deactivation of the oxidative enzymes [10,11] in the ancient China and eastern Asia, green tea was being used as a medicinal herb for the treatment of diabetes [11,12].

Today, using medicinal herbs for treating most of the diseases, especially the infective ones, is increasing due to their less side effects compared to the chemical drugs [13]. Tea can be counted as a medicinal herb that is the most common beverage all around the world. To prepare tea the leaves of *Camellia sinensis* are put under heat and scrubbing immediately after being picked so that the fermented green leaves are processed [14]. Tea includes almost 400 biologically active compounds, one third of which are poly-phenols [15]. Poly-phenols in tea include a big group of substances under the control of catechins. The presence of this compound can justify the beneficial and potential effects of tea in the oral well-being [16].

The main groups of catechin in tea include Epicatechin gallate (ECG), Gallic catechin gallate (GCG), Epigallo catechin (EGC), Epigallocatechin gallate (EGCG) and Epicatechin, the most active of which is EGCG [17].

Green tea is fermented for a short time and has high amount of catechin (poly-phenol), while black tea is fermented for a longer time and more amount of catechin is disintegrated in that [18]. Owing to such compounds, green tea has such properties as anti-oxidant, anti-inflammation, non-carcinogenic, anti-bacteria, anti-decay and reduces the inflammation of gums.

Tea has antioxidant [4,7,19,20], anti-inflammatory, antimicrobial, antimutagenic, antimetastatic and anticarcinogenic activities [21-29]. Tea consumption has useful effect on cancer, and in enhancing the immune function [24,30,31]. One of tea component is catechins, which EGCG is considered the most investigated ingredient [20,24,31-33] and anticancer effects has been evaluated [25,28,34-40].

Tooth

Tooth decay occurs due to abundant microorganisms like *Streptococcus mutans* [41]. *Streptococcus mutans* and *Lactobacillus* are able to produce high amounts of acid and have a high tolerance to acidic environment [42]. The commercial anti-plaque agents are mainly anti-bacterial compounds, however, they can disrupt oral bacterial flora

leading to the induction and increase of opportunistic pathogens such as *Candida albicans*. In the studies carried out on the anti-plaque factors it was revealed that some kinds of tea and their components can be effective on the activity of *Streptococcus mutans* bacteria and the incidence of tooth decay [43,44].

There is some evidence regarding the influence of green tea in the reduction of tooth decay in the experimental human beings and animals, on the basis that green tea can decrease *Streptococcus mutans* in the saliva dramatically and reduce the probability of decay. On the other hand, there is also some evidence regarding the indirect influence of anti-bacterial through the secretion of protective compounds for saliva including immunoglobulin, lysozyme, lactoferrin, hystatyn and myosin [45]. The other mechanism involved in the reduction of decay is the influence of green tea in the control of pH; the EGCG extract in green tea can reduce production of acid followed by the consumption of sugar through restraining lactate dehydrogenase [46]. In addition, poly-phenols can significantly prohibit sticking oral bacteria to the glycoprotein layer on the surface of teeth [47].

Gingivitis and periodontitis are among the inflammatory diseases of mouth, the primary cause of which is bacteria and causes loss of gum tissue and periodontal connections [48]. In gingivitis gums become red and inflamed and in periodontitis gums atrophy and pocket is created [49]. In many studies it is revealed that natural compounds can be effective in control and prevention of periodontal disease [50]. For instance, the prohibitory effect of green tea on the growth of bacteria such as *P. nigrescen*, *P. intermedia* and *P. gingivalis* is suggested [51]. Green tea has high amount of poly-phenol compounds that several studies manifested that they have anti-oxidant effects, such that they consider this effect even more than the anti-oxidant effect of vitamin C [52]. On the other hand, experimental studies manifested the effect of catechins of green tea on decreasing the growth of *P. gingivalis*, *P. intermedia* and stickiness of the *P. gingivalis* to the epithelial cells [53]. In addition, the anti-oxidant property of green tea also can control periodontitis [54].

As it was specified, using mouthwash of green tea causes considerable reduction of *Streptococcus mutans* and *Lactobacilli* in the saliva, plaque and the increase of pH in the saliva [44,55,56]. Suyama et al. [57] revealed in their studies that consumption of green tea gum causes the increase of residence against tooth enamel acid, its remineralization and it is effective in the prevention of tooth decay.

In the collected studies in which the effect of tooth decay was evaluated, the examined criteria in the studies included plaque index, concentration of fluoride in the saliva, the extent of remineralization of tooth enamel, the number of *Streptococcus mutans* bacteria, *Lactobacillus* and decay removal of *Streptococcus mutans*. Although *Streptococcus mutans* and *Lactobacillus* are the main cause of tooth decay and they do so by creating plaque

and sucrose [57,58]. The measurement of DMFT, the amount of recent decays and investigating the other valuable clinical outcomes to observe the effect of using green tea on tooth decay, are not taken into account in any of the studies.

The outcomes including the number of *streptococcus* and acidity of saliva are among the interstitial and replacing outcomes. A final clinical outcome is a variable that refers to sensations, function and survival of patients. The replacing outcomes are biomarkers that are counted as an alternative for the final outcomes and are expected to predict the epidemiology and pathophysiology of the clinical effects according to the studies [59]. In three studies that the mouthwash containing green tea was used in 1 week [45], five minute after using [56], density of 2% and in 2 weeks [48] density of 5% with counting the bacteria was evaluated.

The results of previous studies revealed that green tea can cause reduction of bacterial colonies, the effect of which is comparable with the sodium fluoride mouthwash and maybe it can be used by children with less concern than sodium fluoride.

In Soekanto et al. study [58], he examined pH of the students' saliva after daily consumption of green tea for one month, considering the pH threshold of 5.5 as the pathogenic threshold and demineralization of tooth enamel NNT was approximately calculated 3 (necessity of using green tea by 3 people due to the increase of saliva pH in one case to higher than risk threshold). However, increase of saliva acidity can be one of the indicators of causing *streptococcus* decay. Some part of the reduction of acidity can also be due to the presence of fluoride and buffering property [60,61], as it was manifested in the study of Suyama et al. consumption of chewing gums containing green tea caused the increase of fluoride in saliva significantly [57].

Another study also revealed that the minimum concentration of 50 and 1000 mg/ml green tea catechin decreases the growth of *Streptococcus mutans* and *surbinnus* and these concentrations can be obtained by consuming a cup of green tea [45].

In the studies related to periodontal diseases, in two cases mouthwash of green tea with concentration of 2% and 5% [56,62], in one case chewing gum or chocolate and in one case it was used regionally.

The current review manifested that consumption of green tea in the mentioned forms causes an increase in the index of bleeding gum [55], the depth of periodontal pocket, attachment loss, bleeding with probe, an improvement of the inflammatory response of periodontal structure and periodontal inflammation [49,52]. Kudva et al. [63] in their study manifested that using green tea regionally along with scaling compared to using scaling by itself can cause the reduction of the depth of pocket and all kinds of bacteria except for *P. gingivalis* in a month. Although in this study the bacteria causing periodontitis disease reduces, the clinical indicators such as PI and GI didn't have significant

reduction which represents clinical changes are followed by the decrease of bacterial colonization and occur in the subsequent stages, in addition, the period of 7 days or 2 months is inadequate to observe the outstanding changes in these indicators.

The index of NNT in the study of Krahwinkel et al. [64] that investigated the clinical indexes of API and SBI, was calculated 90 and 45 respectively; while in the study of Kudva et al. [63] in which the bacterial culture was investigated, this index was calculated. This also verifies the same point. The descriptive study of Kushiya et al. [55] on 940 mature participants revealed that each cup of tea in a day had 0.023 mm reduction in the depth of pocket, 0.028 mm reduction in the loss of stickiness of gum and 0.63% reduction in the index of bleeding while probing and the results are significant ($p > 0.05$).

Koyama et al. [65] manifested that the amount of tooth decay has relationship with the amount of using green tea. Linke et al. [66] revealed that consumption of green tea causes reduction of decay in the mice with a diet that creates decay. Subramaniam et al. [67] in the study of the effect of green tea on the growth of *Streptococcus mutans* concluded that using aquatic or alcoholic solution of the green tea leaf restrains the decay-causing bacteria. They concluded that the amount of preventive effect of green tea extract is more on the growth of *Streptococcus mutans* than on chlorhexidine 0.2%.

The effect of green tea along with aerobic exercise on adiponectine and ghrelin serum

Today, it is believed that a diet with anti-inflammatory property can have essential role in preventing the risk of affliction to cardio-vascular diseases in obese and inactive people. Today, green tea is the center of attention as a rich source of anti-oxidant compounds, anti-inflammatory and non-carcinogenic [68]. Poly-phenols of green tea prevent the increase of serum lipids of the liver and cause the increase of the consumed energy, lipid oxidation as well as the decrease of lipid mass.

In addition to its influence on lipid metabolism, green tea can have influence on the act of glucose and resistance against insulin [69]. In the full-fat diets, the animals that used green tea or its poly-phenols had lower triglyceride and cholesterol as well as higher fat in their excrement than the control group [70]. Therefore, green tea can control weight in obese people and has a role in the improvement of resistance to insulin and the loss of weight.

On the other hand, physical activity, as an effective factor has always been important in the loss of weight and the improvement of physical condition. The previous studies have shown that consuming the supplement of green tea along with exercise can cause the decrease of abdominal fat, triglyceride serum and the ratio of respiratory exchange [71-73]. Generally, the human studies with the subject of combining aerobic exercise and the supplement of green tea are focused on metabolism of materials, reduction of lipid profile and oxidation of fat and no study investigated the simultaneous effect of

aerobic exercise and the supplement of green tea on the amount of adiponectin and ghrelin [69,72,73].

In the previous studies, the useful features of green tea, the effects of reducing weight, the fat mass, the level of blood fat in the mice with the deficiency of leptin receptors, the stimulating effects of thermogenesis and the secretion of lipid, the regulating effects of endocrine system and the fat metabolism are identified [74-77]. Few studies carried out in the field of the influence of using green tea and doing exercise on the expression of adipocytokines and ghrelin and most of the studies focused on the effects of green tea by itself. Only in one study along with the current one, Kao *et al.* observed lack of change in adiponectin serum in the effect of doing exercise and consuming green tea at the same time for 12 weeks [78]. In the same regard, Hsu *et al.* investigated the effect of consuming green tea extract (491 catechin containing 302 g epigallocatechin gallate (EGCG)) on the obese women with the age range of 16-60 years [79]. Their results revealed that, despite non-significant decrease of body weight by 3%, the consumption of green tea extract has no effect on Adiponectin and ghrelin serum. They mentioned low consumption of green tea extract and the way of using tea as the reasons of lack of significance and announced that the animal researches suggested consumption of green tea in the form of injection is better than eating.

Mohammadi *et al.* observed the increase of adiponectin serum in the effect of daily consumption of 1.5 g green tea extract containing 210 mg poly-phenol and 150 mg caffeine in the diabetic people in 2 months [80]. They also showed the reverse relationship of adiponectin with the ratio of waist to pelvis, the effect of green tea extract on weight control, the index of body mass and hemoglobin glycoside. Most of the researchers mentioned the effect of green tea extract on the improvement of the distinction of adipocytes as the cause of an increase in adiponectin [81].

In addition, Cho *et al.* measured the secretion of adiponectin by injecting each of the poly-phenols of green tea in adipocytes and observed the increase of adiponectin serum in the effect of consuming green tea [82]. According to these researchers, the catechin of green tea suppresses the KLF7 protein in the pre-making cells of fat tissue T3-L1 and then restrains the statement of adiponectin gene. Lindsey *et al.* stated that in addition to the dose of green tea extract, the quality differences, the way of prescription and the duration of its consumption are important in the effect of tea on adiponectin serum [83]. On the other hand, being accustomed to the consumption of regular tea, which contains caffeine, by the people in the study may decrease the effect of green tea on adiponectins. In addition, the type of samples and how to make extract out of them has a big effect on the results of the studies [84].

Most of the previous studies used green tea in the form of capsule, while in this study the tea bag, which is more common, is used [80].

After 12 weeks of consuming green tea extract in women, Hsu *et al.* observed the lack of change in ghrelin in the case group and they related that to low consumption of green tea [79]. The carried out studies in this area manifest that green tea decreases blood sugar and ghrelin serum has a reverse relationship with blood sugar, such that decreasing blood sugar causes the increase of ghrelin [85-87]. Thus, this way green tea can increase ghrelin. In the current study the amount of blood sugar didn't have any significant change in the control and test group. Therefore, the consumption of green tea couldn't exert its influence on the amount of ghrelin serum. In addition, Mehdizade *et al.* stated that the most suitable dose of green tea extract for the reduction of blood sugar is 100 mg in exchange for each kilogram of body weight [88].

Green tea increases the consumed energy and fat oxidation in the short run [69]. In addition, it contains two primary substances of catechin poly-phenol and caffeine. Poly-phenol catechin extends the duration of the effect of catecholamine and caffeine stimulates the secretion of norepinephrine. On the other hand, it is thought that catecholamine causes loss of weight by stimulating satiety, the increase of fat oxidation and caffeine [89]. With regard to the fact that ghrelin is decreased at the time of satiety, perhaps the amount of consuming green tea, catechin poly-phenol and caffeine in that is not to the extent of being able to influence catecholamine and be effective in the creation of the feeling of satiety and the change of ghrelin serum. In addition, lack of significant change in ghrelin can be due to free fatty acids in blood; for the green tea caffeine can release fat into the blood stream through stimulating the central nervous system [89].

Green tea is rich in nutrients and reduces appetite, along with the loss of appetite the level of ghrelin is reduced, too [90]. Richards *et al.* explored the effect of consuming EGCG, three capsules a day containing 135 mg EGCG for 14 days on the maximum oxygen uptake while doing exercise on the ergometer bicycle with the intensity of 25-30 watt per minute up to fatigue [91]. The researchers confirmed the increase of maximum consumed energy after consuming EGCG for a short time and attributed the increase to the effect of EGCG in increasing arterial-venous oxygen distinction. In addition, Muras *et al.* in a study on mice stated that consuming the green tea extract for 8 weeks along with doing exercise increases endurance running capacity on the treadmill until fatigue [92].

Cholesterol

EGCG causes a decrease in the food intake, reduces the levels of triglyceride, cholesterol and leptin in the blood, stimulates the metabolism of energy and increases the amount of HDL [93,94]. Shimotoyodme *et al.* in a study on mice found out that when consuming green tea is along with doing exercise the mice's body fat has further reduction than when it is consumed without doing exercise [95]. By the same token, Cardoso *et al.* examined the effect of consuming green tea, doing resistance

training on the body composition and the metabolic rate of resting in the over-weight and obese women. After 4-week diet, 36 subjects were divided into four groups of placebo, green tea and resistance training as well as placebo and resistance training.

People participated in a resistance training schedule for 8 weeks. The results revealed that compared to the other groups, the consumption of green tea along with resistance training causes the increase of metabolic rate of resting, net weight of the body, power and decrease of fat percentage of the body, waist and triglyceride stores [96]. The results led to the proposition of new viewpoints regarding the effect of green tea, highlighting the potential benefits in the prevention or treatment of obesity and metabolic syndrome as well as the relevant metabolisms [97]. In addition, studying lipid metabolism in animals, tissues and cells manifested that the consumption of tea and catechin decreases triacylglycerol and total cholesterol, prevents accumulation of fat in the liver and stimulates thermogenesis [98].

Generally, some studies confirmed the effect of catechin green tea on the lipid percentage and body composition [10,72,73,98-101], while this effect is not confirmed in some studies (with regard to the different results in these researches [102-104]).

Shen *et al.* investigated the polyphenol effect of green tea on the body composition and the quality of bone in the obese mice with high-fat diet. Their results suggested that consuming the supplement of polyphenol for 4 month reduces the lipid percentage in the body, increases lean mass, power and the density of minerals in the bones of mice. They believe that this improvement is due to the possible impact of polyphenols on the increase of antioxidant capacity and the decrease of inflammation [101]. In addition, Lonac *et al.* manifested that the short-term consumption of epigallocatechin gallate supplement (7 capsules of 135 g during three days) don't increase the metabolic rate, resting and thermic effect of food [103].

EGCG has the increase of lipid oxidation and the effects of anti-obesity in men [105].

They stated that even if lipolysis and oxidation of lipid increase with the moderate intensity during exercise, green tea can increase lipid metabolism. Hill *et al.* studied the effect of doing aerobic exercise with the moderate intensity for 12 weeks along with consumption of 300 mg EGCG on the abdominal fat of the over-weight and obese women. Their results revealed that consumption of EGCG doesn't cause further reduction of fat than what aerobic exercise does [104].

In another research Cunha *et al.* manifested that daily intake of 400 mg green tea extract per kilogram of body weight for 8 weeks doesn't make any significant change in the amount of total cholesterol and triglyceride, but it can increase the concentration of HDL adiponectin. This increase was along with anti-inflammatory effects of tea [102]. In addition, Nagao *et al.* revealed that consuming the beverage containing 690 mg catechin for 12 weeks

causes a significant decrease in the body fat and the fat under the skin of healthy men [99]. It doesn't have significant effect on the lipidic profile of blood. Nagao *et al.* in another study concluded that catechin causes the decrease of LDL [106].

Ota *et al.* examined the effects of the beverage containing catechin of green tea on the body composition and distribution of fat in over-weight and obese adults during physical activity. They found out that the group that received the beverage containing catechin had a significant decrease in the concentration of free fatty acids and TG and the abdominal and total fat decreased significantly. However, there was no change in the amount of total cholesterol and lipoprotein [72].

Analgesic effects

On the other hand, the analgesic and anti-inflammatory effect of polyphenols in different plants has been specified through different studies [107,108], many researcher also showed the effect of phenolic composition of green tea on the reduction of neuropathic pains and recovery of digestive ulcers [109,110]. The relationship between the results of previous studies represents that the flavanoid compositions of such plants are able to exert anti-inflammatory effects due to having protective agents [111] through which they probably can reduce the intensity of pain and inflammation. The direct effect of flavanoids on the prostaglandins' synthesis is definitely specified [112]. With regard to the current evidence flavanoids restrain the production of prostaglandins in response to the inflammatory stimulants by restraining cyclooxygenase enzyme, as a result, sensitivity of the pain receptors that are made by these molecules are prevented, subsequently; they reduce the analgesia accompanying these responses [113]. On the other hand, the anti-inflammatory processes are along with the restraint of free radical activity [113]. In this regard the flavanoids in the green tea extract can justify the analgesic effects of green tea to some extent by exerting the anti-oxidant effects [114].

Green tea with the analgesic effect of morphine makes the neuropathic pains better through restraining the production of NO [115]. Recently, most of the useful effects mentioned about green tea are attribute to its most abundant catechin *i.e.* epigallo catechin 3-gallate (EGCG) [116,117].

Catechins draw attention both in the scientific society and among the common people due to their useful effects on health. Catechins of green tea can be useful in the treatment of most of the inflammatory diseases including osteoarthritis and rheumatoid arthritis [118,119].

Additionally, it is manifested that consumption of green tea improves the reflective and sensory disorders arising out of chronic inflammation and pressure on the sciatic nerve [120] green tea contains some polyphenol compounds called catechin [121].

Epigallocatechin gallate (EGCG) is the most abundant polyphenol compound in green tea and it seems that

most of the biologic activity of green tea is due to the same compound [122]. The researches revealed that EGCG has protective effects in the face of cerebral ischemic harms [123,124] and neurodegenerative diseases [7,125]. Studies have shown that catechins exert their neuroprotective effects through restraining free radicals, decreasing peroxidation of lipid, decreasing apoptosis and the anti-inflammatory effects.

According to the studies carried out on the neuroprotective properties of EGCG in the neurodegenerative [125] and cerebral ischemia [122], one of the possible mechanisms recommended by the researchers is the restrictive effect of this compound on peroxidation of fat suggested by free radicals. Polyphenols in green tea can connect to the free radicals and neutralize them due to the hydroxyl group in their structure [5]. In addition, they can increase endogenous anti-oxidants indirectly [126]. Researchers have shown that the injection of EGCG reduces the damage to white matter surrounding cerebral ventricles in the hydrocephalus animal model [127].

A study showed that use of *Camellia sinensis* (L.) had good effect on cerebral cortex metabolic and oxidative profile in pre-diabetic rats. They suggested that its consumption can be a reliable strategy to prevent DM-related impacts in the cerebral cortex [128].

Antimicrobial effects

So far, there have been several reports on the antimicrobial effects of different kinds of tea [129] and its net polyphenols [130] against different kinds of microbes. Its synergistic effects with antibiotics have also been reported [131,132]. Some studies represent antifungal effects of green tea [133,134]. There are different studies on the effect of herbal extracts such as *Roy Pseudomonas aeruginosa* [135,136]. The tea extracts eliminates or inhibits the growth of pathogenic bacteria and the concentration of 3 mg/ml tea in a cup is able to eliminate *Staphylococcus aureus* resistant to methicillin [137-140].

The polyphenols of green and black tea leaf have inhibitory effect on the growth of *E. coli*, *Streptococcus* and *S. aureus*. The extracts of green and black tea inhibit the biofilm formation and growth of *enterobacteriaceae* [86].

The researchers found out that the tea extracts are against *clostridium* species, the herbal pathogenic bacteria like *arvinia* and active *pseudomonas* species. There are different views regarding sensitive bacteria to tea that can be resulted from the tea resources [141].

Epigallo catechin in the tea also increases tetracycline activity on the *staphylococci* [10].

The catechin molecules including epicatechin, epigallo catechin and epicatechin gallate prevent growth of *H. pylori* and are able to restrain urease by that [44].

Gao et al. revealed that the increase of tea consumption reduces the risk of gastric cancer [142]. Some

researchers proved that green tea prevents the chronic and active inflammation of digestive system and reduces the risk of cancer in lower parts of the body [143]. A recent investigation indicated that Green tea has antibacterial effect on *Streptococcus mutans* and *Lactobacillus acidophilus* [18].

The antibacterial property of polyphenols in green tea also revealed that the polyphenols in the tea leaf have inhibitory effect on the growth of *E. coli*, *Streptococcus pyogenes* and *Staphylococcus aureus* [144]. Green tea that is, in fact, unfermented green tea leaf contains considerable amount of anti-oxidant and anti-inflammatory materials, its inhibitory effects on the growth of *streptococcus* was inaugurated by Toda et al. in 1989 [145] and after years, its anti-decay effect was confirmed in different studies [146,147].

The extract of polyphenol in green tea is a source of catechin and theaflavins that prevents the growth and sticking *Streptococcus mutans* to the tooth surface. It seems that this effect results from the restraint of glucosyl transfer enzyme activity from *Streptococcus mutans* by polyphenols [148,149].

CONCLUSION

Generally, according to the compiled studies, green tea has positive effect on the improvement of periodontal status and reduction of tooth decay and the results of most of the studies suggest this positive effect. The evaluated criteria in studies in which the effect of green tea on the periodontal diseases was investigated, was clinically more reliable and valuable. The results of studies reveal that green tea has analgesic, antimicrobial properties and reduces the blood fat. Investigating the effect of green tea requires longer time and more concrete criteria.

CONFLICT OF INTEREST

The author(s) declare(s) that there is no conflict of interest regarding the publication of this article.

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