



Awareness of Therapeutic Benefits of Green Tea among Dental Fraternity

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Authors' contributions

This work was carried out in collaboration among all authors. Author NFRM designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author DG managed the analyses of the study. Author LKS managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Green tea is a popular beverage and in vitro studies have shown that green tea phenols inhibit the growth and cellular adherence of periodontal pathogens and their production of virulence factors. The antioxidants, bacteria battling catechins and other micronutrients in green tea fortify tooth structures, whitens teeth, keep breath fresh, and dissolves plaque. Green tea controls bacteria and lowers the acidity of saliva and dental plaque, it may be a useful tool in preventing cavities. Green tea's anti-inflammatory powers seem to help control periodontal (gum) disease. The aim of this present survey was to establish awareness of the therapeutic benefits of green tea among the dental fraternity. A descriptive survey was conducted among dental students of Saveetha Dental college using a questionnaire in the google form. The questionnaire consists of 15 questions that were framed based on the knowledge of the therapeutic benefits of green tea in oral health and sent to 75 subjects. The data was collected and systematically analyzed that 62% of participants reported that green tea removes bad breath, 68% of participants reported that green tea has anti-inflammatory effects that heal gum diseases. About 64% of participants reported that frequent

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intake of green tea would decrease dental caries formation. About 60% of participants reported that green tea has curative properties against dental caries, gingivitis, periodontitis, and oral malignancy. Based on this survey, the knowledge and awareness about the therapeutic benefits of green tea among the dental fraternity have been known by the majority of persons.

Keywords: Awareness; green tea; dental.

1. INTRODUCTION

Green and black tea polyphenols have been extensively studied as cancer chemopreventive and antioxidant agents. Green tea (botanical name of tea plant is *Camellia sinensis*) belongs to the family *Theaceae* has been explored for its beneficial effects on oral health in recent years. It can be grown as a shrub [1]. Green tea with active chemical ingredients possesses diverse pharmacological properties that possess anti-inflammatory, anti-cariogenic, antioxidant, and antibacterial effects [2]. Green tea is an essential source for providing polyphenol antioxidants and has the ability to protect against various oral diseases such as dental caries, gingivitis, periodontitis, halitosis, and oral malignancy (protection and regression). In addition, it could prevent oral oxidative stress, inflammations resulting due to cigarette smoke and reduce dentin erosion and abrasion [3]. Mahmood et al. reported that students who were consuming green tea had good periodontal health status with minimal plaque accumulation in comparison with consumers of black tea [4]. Periodontal health was inversely related to consumption of green tea, an epidemiological study proves that people have better periodontal health if they drink green tea very often for example during meals or at breaks from work, along with eating habits and nutritional intake also affects periodontal health [5,6]. Many studies have reported that consumption of vitamin C and calcium was linked to periodontal disease and that the consumption of whole-grain and lactic acid foods has a prophylactic effect on the periodontal disease [7]

Recent advances related to this topic have concluded that consuming Green tea was found more effective than combination mouth rinse in restoring the salivary pH post sugar exposure in children [8]. A study proved that increasing penetration of epigallocatechin gallate (EGCG) from the green tea extract using trans ethosomal gel and the results showed that transethosomes can be considered as an alternative solution to increase gel stability and penetration through the skin [9]. Another recent study showed that

compared to scaling and root planing alone, the local drug delivery gel containing green tea catechin as an adjuvant was more effective in reducing the clinical parameters of periodontitis [10]. Most advanced studies evaluate the effects of different concentrations of sodium ascorbate (SA), green tea (GT), and chamomile (CM) on the shear bond strength (SBS) of metal orthodontic brackets bonded to teeth bleached with 40% hydrogen peroxide (HP). Results showed that bond strength can be enhanced by using 0.5% or 1% GT or 0.5% CM to allow bracket bonding immediately after bleaching [11]

Recent studies have emphasized that in addition to the microbial activity, the host immune-inflammatory reactions destroy the oral tissues to a greater extent [12]. In such cases, green tea is considered to be a natural preventive and curative agent. There is a growing search of evidence for understanding the beneficial role of green tea and its polyphenols in oral health [13]. Numerous studies have shown the beneficial effects on the regular intake of green tea in maintaining oral health [14].

Previously our department has published extensive research on various aspects of prosthetic dentistry [15–25], this vast research experience has inspired us to research on epidemiological surveys and related researches. The idea for this survey stemmed from the current interest in our community and to create awareness and to knowledge the people to lead a healthy life. Even though studies demonstrate the health effects of green tea polyphenols, more clinical and biological studies to support guidelines for green tea intake as part of the prevention and treatment of specific oral pathologies are needed. Hence, the aim of this present survey was to assess the level of awareness of the therapeutic benefits of green tea among the dental fraternity.

2. MATERIALS AND METHODS

The questionnaire-based study was carried out online through google forms. Individuality was ensured when the subjects filled up the survey. The participants who undertook the survey are

undergraduate students of various dental colleges. A total of 15 questions were asked to detect if the subjects were aware of the therapeutic benefits of green tea among the dental fraternity. We received the responses from 75 participants. The questions were mainly targeted on the benefits and effects of consuming green tea for maintaining oral health.

3. RESULTS AND DISCUSSION

In light of the reactions and answers from the subjects, the factual examination was performed and the outcomes were arranged methodically and analysis was performed and the results were tabulated systematically. In this study 75 students answered this questionnaire, the data were collected and systematically analyzed and represented as pie charts. In Fig. 1, the results showed that about 82% of participants prefer green tea while 18% do not prefer it. In Fig. 2, about 68% of participants revealed that they would consume green tea in the morning, 13% in the afternoon, 35% in the evening, and 2% at night. Fig. 3 showed that the Majority of participants nearly 80% consume green tea for physical maintenance, 70% for maintaining diet, 68% to decrease obesity, and 20% for improving brain function. Fig. 4 showed that 87% take green tea once a day while 18% of participants twice a day. Fig. 5 showed that 78.5% of participants felt refreshed after consuming green tea and 75.2% felt active after consuming while 18.3% were not aware of it. Fig. 6 showed that the majority of participants about 92% felt changes in the oral cavity after consuming green tea while 8% were not aware of it. Fig. 7 showed that 55% of participants aware of green tea influence dental problems. 20% were not aware of it. In Fig. 8, the results showed that 62% of participants reported that green tea removes bad breath and 38% were not aware of it. Fig. 9 explains that 68% of participants reported that green tea has anti-inflammatory effects that heal gum diseases and 32% of participants are not aware of it. Fig. 10 shows that about 52% of participants answered that green tea extract has the ability to decrease volatile sulfur components levels in patients with gingivitis while 48% of participants did not know about that. Fig. 11 showed that the majority of participants nearly 64% reported that frequent intake of green tea would decrease dental caries formation and 56% were not aware

of it. Fig. 12 shows that nearly 68% of participants reported that green tea has curative property in dental problems like dental caries while 33% were not sure about it and about 60% of participants answered for gingivitis which could be cured by green tea and 36% were not aware of it. About 61% of participants reported that periodontitis can be cured by green tea while 40% were not aware of it. The majority of participants about 60% answered that oral malignancy would be cured with green tea extract and around 68% of participants reported that dental caries, gingivitis, periodontitis, and oral malignancy would be cured by green tea extract.

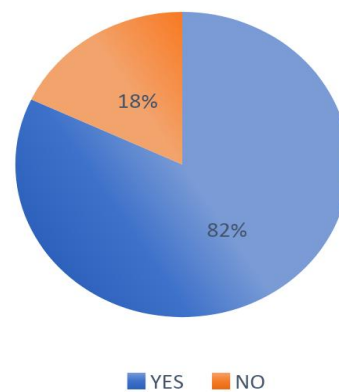


Fig. 1. The above pie chart shows resonances for preference of green tea, about 82% of participants prefer green tea while 18% do not prefer it

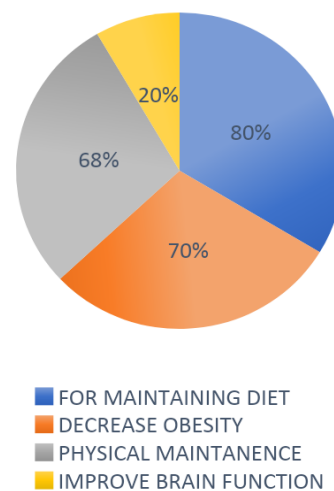


Fig. 2. The above pie chart shows, that Majority of participants nearly 80% consume green tea for physical maintenance, 70% for maintaining diet, 68% to decrease obesity and 20% for improving brain function

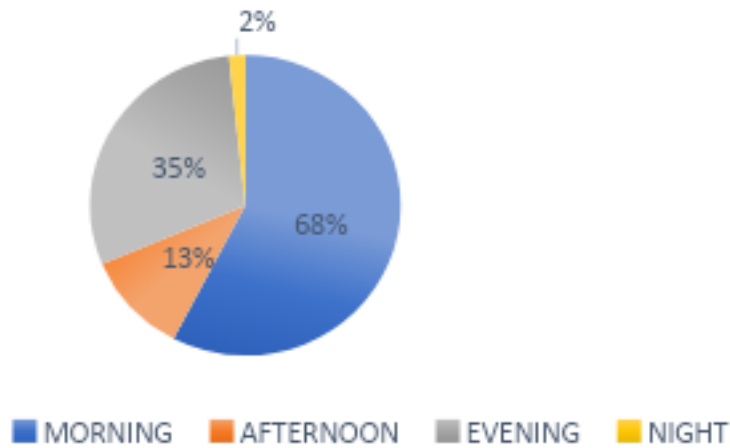


Fig. 3. The above pie chart shows responses for the reason for consuming green tea, about 68% of participants revealed that they would consume green tea in the morning, 13% in afternoon, 35% in evening and 2% at night

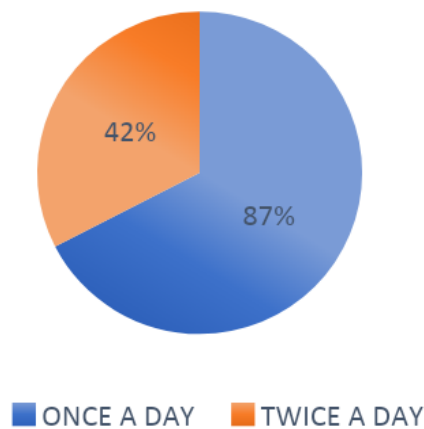


Fig. 4. The above pie chart shows responses for frequency of consuming green tea, that 87% take green tea once a day while 13% of participants twice a day

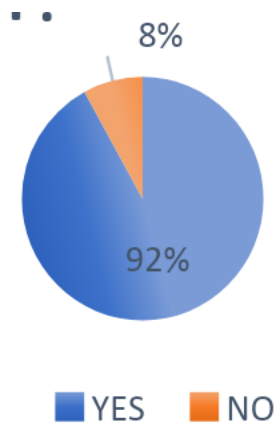


Fig. 5. The above pie chart shows responses for the immediate effect of green tea after consuming, 92% of participants felt refreshed after consuming green tea and 8% felt active after consuming while 8% were not aware of it

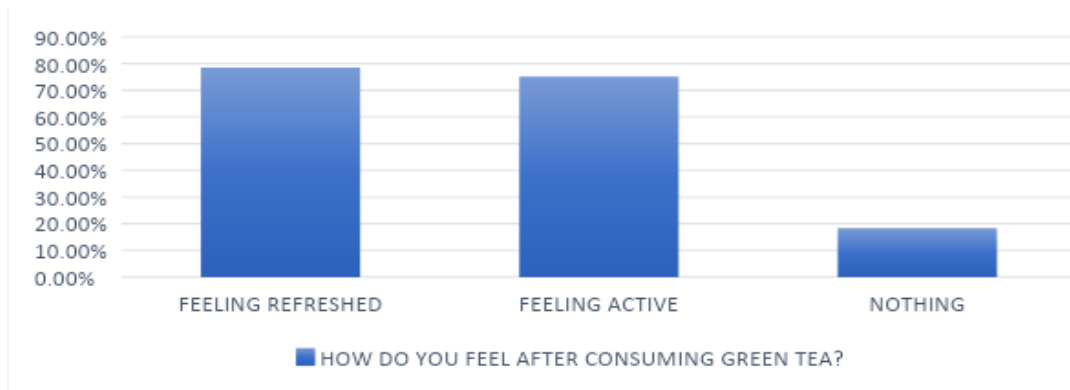


Fig. 6. Shows that the majority of participants about 92% felt changes in after consuming green tea while 8% were not aware of it

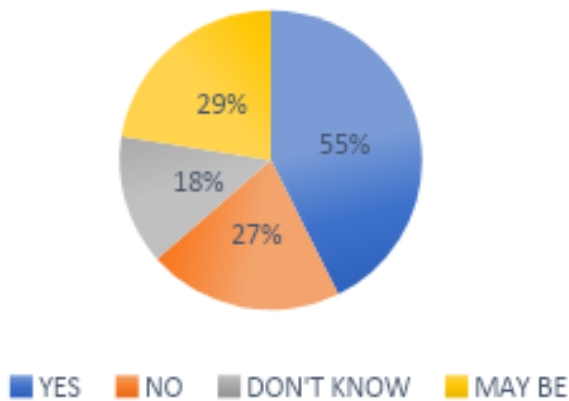


Fig. 7. The above pie chart shows responses for knowledge of effects of green tea in oral health, that 55% of participants aware of green tea influence dental problems. 20% were not aware of it

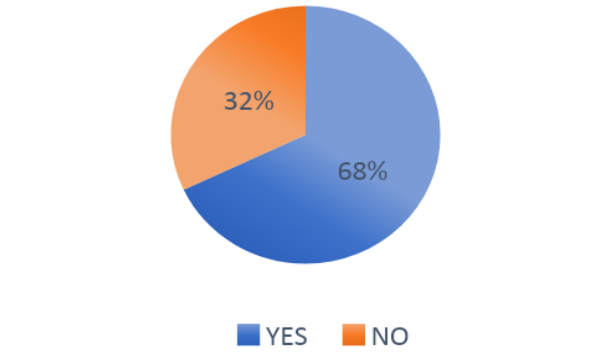


Fig. 9. The above pie chart shows responses for awareness of anti-inflammatory effects of green tea, 68% of participants reported that green tea has anti-inflammatory effects which heal gum diseases and 32% of participants are not aware of it

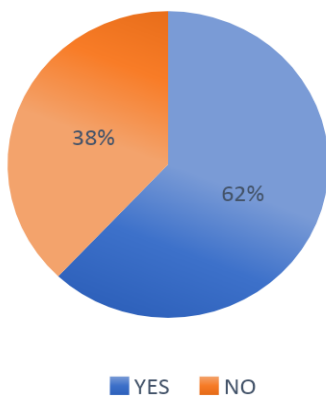


Fig. 8. The above pie chart shows responses for the effect of green tea on bad oral odor, 62% participants reported that green tea reduces bad breath and 38% were not aware of it

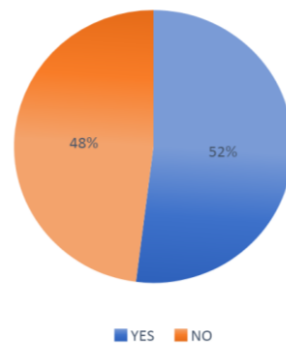


Fig. 10. The above pie chart shows responses for the awareness on the ability of green tea to reduce volatile sulphur compounds, 52% of participants answered that green tea extract has the ability to decrease volatile sulphur components levels in patients with gingivitis while 48% of participants did not know about that

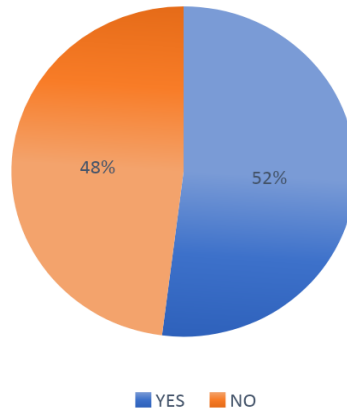


Fig. 11. The above pie chart shows responses for the effect of green tea on dental caries, that the majority of participants nearly 64% reported that frequent intake of green tea would decrease dental caries formation and 56% were not aware of it

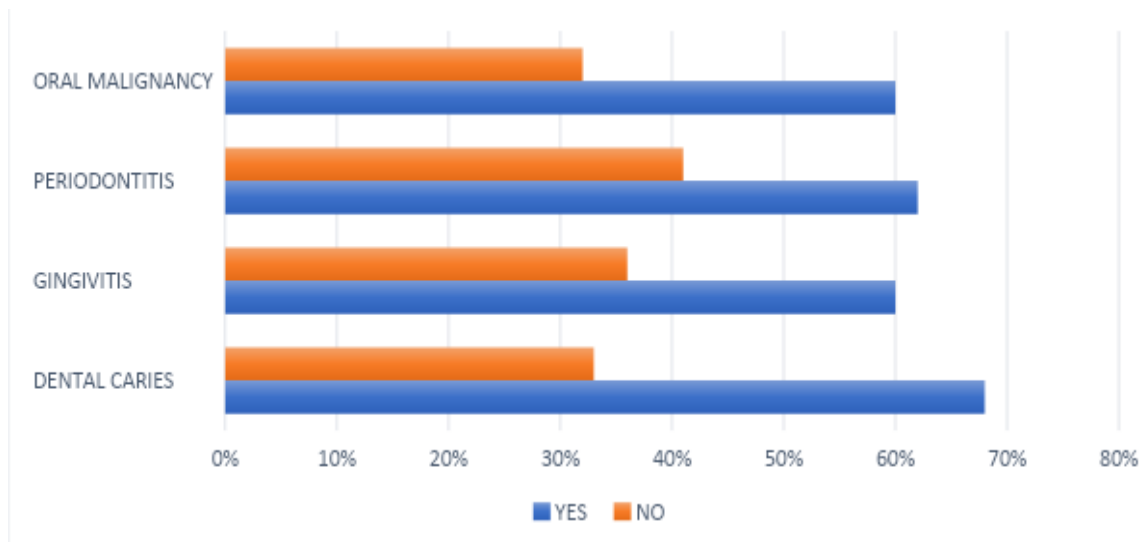


Fig. 12. Green tea has curative properties in dental problems like?

Fig. 12 shows that nearly 68% of participants reported that green tea has curative property in dental problems like dental caries while 33% were not sure about it and about 60% of participants answered for gingivitis which could be cured by green tea and 36% were not aware of it. About 61% of participants reported that periodontitis can be cured by green tea while 40% were not aware of it. Majority of participants about 60% answered that oral malignancy would be cured with green tea extract and around 68% of participants reported that dental caries, gingivitis, periodontitis and oral malignancy would be cured by green tea extract.

Green tea is a popular drink, and the intake of green tea and its components, such as catechin,

had a preventive effect against cancer development and cardiovascular disease in experimental and epidemiologic studies [26,27]. Green tea leaves are rich in fluoride and other components such as polyphenols (catechins) that play a supportive role in resisting dental carrying as reported in many studies [28,29]. Deodorant action of ingredients decreases in the following order: EGCG > EGC > ECG > EC. The deodorizing action of EGCG is based on a chemical reaction of EGCG and MSH and introducing methylsulfinyl/methylthio group into the B ring of EGCG. During this reaction, a methylthio group is supplemented in ortho quinone form of the catechin produced by oxidation, hence eliminating the halitosis [30] which can be relevant to the present study (Fig. 9).

Oral malignancy can be cured by green tea by Hamsters with induced buccal pouch tumor were given green tea until the end of the experiment. It was noticed that the hamsters of the study group when compared with the control group showed lesser pathological changes and tumor size [31]. The chemical compound in green tea, EGCG, and epicatechin gallate inhibited lactate dehydrogenase activity much more efficiently than epigallocatechin, epicatechin, catechin, or gallic catechin. These results suggest that EGCG is effective in reducing acid production in dental plaque and mutans streptococci [32] Hirasawa et al. also demonstrated bactericidal activity of green tea catechins against *Prevotella* and *P. gingivalis* at a concentration of 1 mg/ml. They found a significant reduction in markers of gingivitis after the use of a slow-release buccal delivery system applied over a period of 8 weeks. More recent studies have shown that some virulence factors (toxic metabolites, protein tyrosine phosphatase, and gingipains) and aetiological agents of periodontal disease are neutralized by EGCG.

Barouti et al. [33] 2018 found that a four-week regimen of mouth washing with a dilute catechin solution reduced the mouth odor (halitosis) associated with periodontal disease. Tea catechins especially EGCG deodorizes methyl mercaptan, the main cause of halitosis [34] EGCG (active at 250–500 µg/ml) inhibited growth and adhesion of *Porphyromonas gingivalis* to buccal epithelial cells [35]

In light of the results of the survey, it was evident that the majority of the students were aware of the therapeutic benefits of green tea among the dental fraternity. Overconsumption of green tea causes unfavorable impacts in the human body. More research might be required to edify the general public on the consumption of green tea and its antagonistic impacts on oral health in further studies.

4. CONCLUSION

Based on this survey, following conclusions can be drawn, the majority of the participants have adequate knowledge and awareness about the therapeutic benefits of green tea. However these findings can be used for further research, the studies with clinical interventions will provide more awareness on the effects of green tea on oral tissues. More continuing education and awareness programs can be initiated to enhance

more improved understanding of the health benefits of green tea.

CONSENT

As per international standard or university standard, Participants' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

It is not applicable.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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