



## RESEARCH ARTICLE

### GREEN TEA – A MIRACLE DRINK FOR ORAL HEALTH

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#### ABSTRACT

Green tea is the most soughtful beverage of both the young and old due to its numerous health benefits. The biological activity of its components like catechin constitute towards this quality of green tea. Numerous studies have proved the antioxidant properties of green tea. Present study investigates its role in reducing the count of streptococcus mutans in the oral cavity and its effect on the salivary pH.

**Aim:** To evaluate the salivary pH and streptococcus mutans count in healthy individuals before and after rinsing the oral cavity with green tea.

**Materials and methods:** Unstimulated saliva is collected from 45 healthy south Indian population in the age group of 18 years and above. Salivary samples are collected before and after rinsing the oral cavity with green tea and tested for salivary pH using pH strips and Streptococcus mutans count in mitis salivarius agar.

**Results:** To find the significant difference unpaired T test was used. There is statistically significant increase in salivary pH and decrease in streptococcus mutans count after rinsing the mouth with green tea.

**Conclusion:** Based on the results of the study it could be advisable to encourage regular consumption of this healthy drink and to incorporate it in mouthwashes, toothpaste and chewing gums.

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#### INTRODUCTION

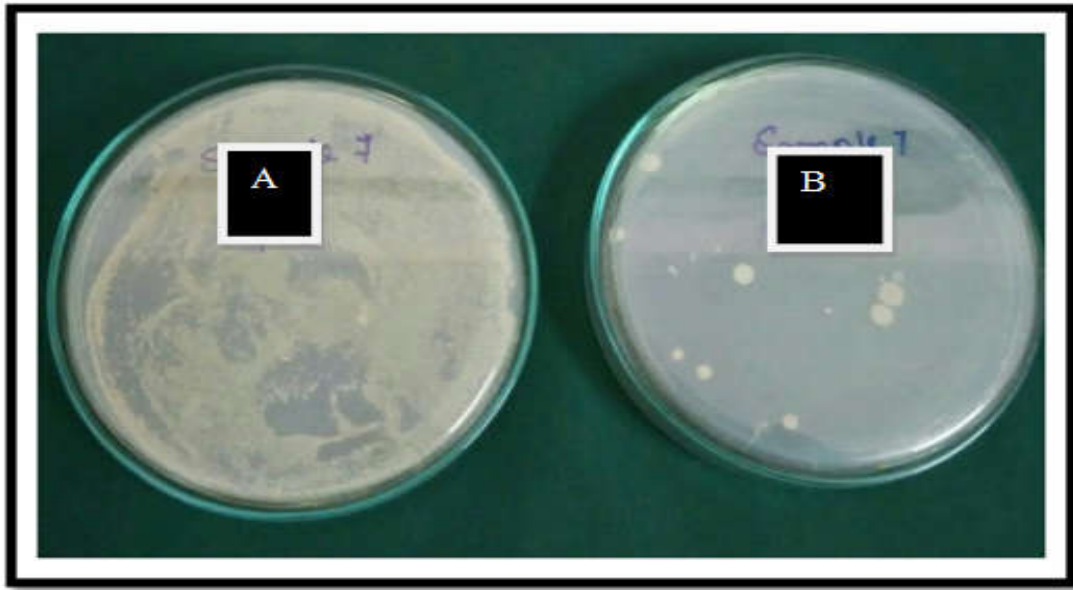
Green tea has been considered, in traditional Chinese medicine as a healthy beverage and one of the most widely consumed beverages in the world. Green tea is an important source of polyphenol antioxidants. The main Polyphenols are catechins and also consists of proteins, carbohydrates, lipids, vitamins, pigments and minerals (Sangameshwar, 2014). Many of the beneficial effects of green tea were attributed to its most abundant catechin-epigallocatechin gallate. The first green tea was exported from India to Japan during the 17<sup>th</sup> century (Sabu, 20105). The traditional Chinese medicine has recommended green tea plant for headaches, general body ache, digestion, depression, as an energizer and to prolong life. Green tea also has many oral health benefits. It has cognitive function and positive impact on bone density, caries, periodontal disease and diabetes (Babu Venkateswara *et al.*, 2011). Dental disease remains as a significant problem with majority of population suffering with consequences of disease at some stage in their lives.

Oral cavity harbours wide variety of micro organisms, these are considered crucial for the initiation and progression of dental disease. Dental caries is a multifactorial condition in which diet, nutrition, the oral flora and the host response interact to determine whether the infection occurs. Anecdotal reports quoted in the Japanese literature, such as "those who continuously drink a large amount of green tea have less tooth decay" and "drinking green tea makes the mouth clean" have spurred research into the potential of tea as an anticaries agent (Eric *et al.*, 2011).

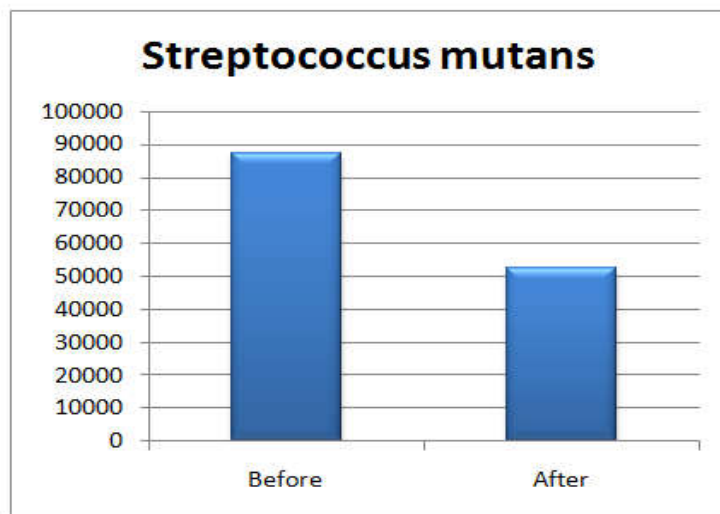
Green tea prevent tooth decay by inhibiting both Gram positive and Gram negative oral bacteria and also prevents the development of bacterial plaque. Green tea polyphenols work as antiplaque agents by suppressing glucosyl transferase, which oral bacteria use to feed on sugar. Few studies suggested that after consumption of green tea there was significant reduction in cariogenic pathogens such as streptococcus, lactobacillus and increase in the pH level. Hence the present study was aimed at evaluating and comparing the pH of saliva before and after swishing the mouth with green tea and to evaluate the role of green tea on oral bacterial growth in saliva culture.

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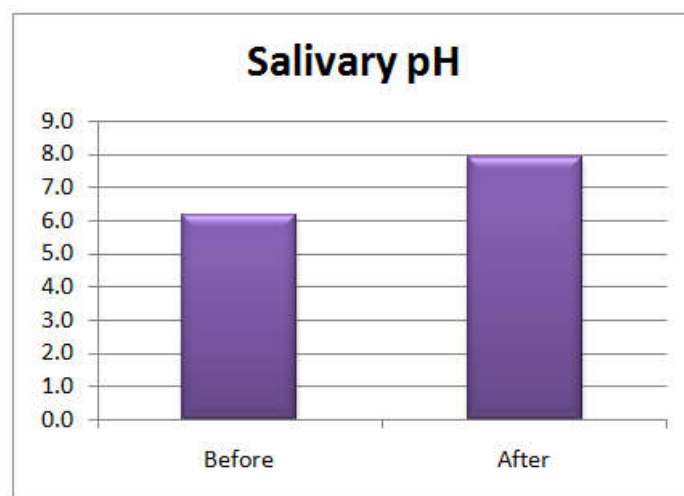
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A-streptococcus mutans count before swishing with green tea B- streptococcus mutans count after swishing with green tea



Graph 1.



Graph 2.

## MATERIALS AND METHODS

A total of 45 patients were included in the study between the age group of 20-60 years who visited the dental OP of Meenakshi Ammal Dental College and Hospital, were randomly selected. Persons above the age group of 20 years, an individual with high risk of caries and more than 3 dental caries are included in this study. Patients with systemic diseases, potentially malignant disorders, patients undergoing radiotherapy, patients who are not willing for the study were excluded.

The study was well explained to the participants and Consent form was obtained. Unstimulated saliva was collected from the patient using sterile plastic disposable container before and five minutes after swishing with green tea in two different containers and labelled. The pH of saliva was determined using pH strips. The saliva samples collected were inoculated in Mitis salivarius agar. The media plates were inoculated for 48 hours at 37 degree celcius. Following incubation, counting of colonies were done. The count of streptococcus mutans was expressed as a number of colony forming units per milliliter (cfu/ml) (Picture A & B).

## PREPARATION OF GREEN TEA

Fresh green tea was procured from the local market which is available in the form of green tip dip bags. Two percent of green tea was prepared with 2 grams of green tea bag dipped in 100ml of hot water for two-three minutes and they were dispensed in disposable cups for the participants.

## RESULTS

The mean, standard deviation and p value were calculated and comparison was made. The data was analyzed using unpaired T Test and p value 0.05 was considered as significant. On comparison there was significant difference between salivary streptococcus mutans count before and after swishing with green tea (Graph-1) and salivary ph before and after swishing with green tea (Graph-2)

## DISCUSSION

Over the last few decades, an alarming march towards natural herbal products is increasing. Tea is the common beverage consumed worldwide. Tea from the plant *Camellia sinensis* is consumed in different parts of the world as green tea, black tea and oolong tea. Among all these the most significant effect on human health is observed in Green tea (Sabu and Chacko, 2010). The epigallocatechin gallate (EGCG) present in the green tea contributes to its antioxidant property. The antioxidant property of green tea is due to its polyphenol. Catechin is the potent polyphenol present in Green tea. They are of six types: catechin, epicatechin, galocatechin, epigallocatechin, epicatechin gallate, epigallocatechin galate (EGCG) (Eric *et al.*, 2011). It is well known that green tea is a potent antioxidant than vitamin E and C (wiseman 1997). Besides acting as scavengers it also promotes glutathione, glutathione reductase, quinine reductase (Marcel *et al.*, 2004).

According to Michael *et al.* increased consumption of green tea was closely associated with a decreased number of axillary lymph node metastases, especially among premenopausal patients with stage 1 and stage 2 breast cancers. Green tea polyphenols acts as anticariogenic agent. According to Melissa *et al.* green tea reduced dentin wear under erosive and abrasive condition. According to Babu *et al.* green tea inhibits the collagenase activity of oral bacteria, effective in preventing gingival and periodontal health. Otake *et al.* found that sunphenon prevented the attachment of *Streptococcus mutans* to the teeth (Devanand, 2013). Green tea promoted glucose metabolism in normal individuals. The effect of tea on obesity and diabetes have received increasing attention. Epigallocatechin gallate appears to have antiobesity and antidiabetic effects by increasing postprandial thermogenesis and fat oxidation (Eric *et al.*, 2011). Green tea also lowers the risk of stroke and coronary artery disease by lowering the blood pressure. Green tea has an inhibitory effect on *Helicobacter pylori* infection. It also acts against Adeno virus and the earlier stages of Herpes simplex virus. Weber *et al.* observed that adenovirus infection is inhibited by green tea catechins (Sabu and Chacko, 2010).

It possesses both anti-inflammatory and chemo preventive properties. It inhibits the T-cell activation, migration, and proliferation and also controls other inflammatory mediators. It is known to reduce the symptoms of Oral Lichen Planus by involving in the etiopathogenesis of the diseases (Gujjar, 2015). Green tea and its major polyphenols constituents, tea catechins, have been shown to have many health benefits including cancer prevention. Tea catechins and tea catechin metabolites / catabolites are bioavailable in the systemic circulation after oral intake of green tea or green tea catechins. Tea pigments are the oxidized product of 40% green tea polyphenols and are composed primarily of the aflavins and the arubigins. Applying the tea extracts directly to the lesions may help improve the local concentrations of the active constituents.

A limited number of chemoprevention trials of green tea or green tea catechins have been conducted to date and have observed potential preventive activity for oral, prostate, and colorectal cancer. Emerging data from multiple ongoing intervention trials will further contribute to defining the cancer preventive activity of green tea or green tea catechins (Manigandan and Hemalatha, 2015). In oral sub mucous fibrosis (osmf) patients green tea was seen to be more efficacious in improving mouth opening, tongue protrusion, burning sensation and size of the lesion. In osmf patients, it proves to be a more reliable newer treatment modality. However improvements were observed in pain associated with the lesion, difficulty in swallowing and speech. Therefore it could be used as a promising treatment modality for osmf (Richa Wadhawan *et al.*, 2015). In our study there is significant increase in pH of saliva and decrease in *Streptococcus mutans* count after rinsing with green tea. Decrease in pH is due to the inhibitory activity of enzymes; Salivary amylase and lactic dehydrogenase. Decrease in *Streptococcus mutans* count contributes to the inhibition of proliferation of mutans, inhibition of adherence to tooth enamel and inhibits glucosyl transferase. These factors contribute to the anticariogenic effect of green tea.

## Conclusion

The health benefits of green tea is attributed to its antioxidant potential. The present study concluded that consumption of green tea decreased streptococcus mutans count and an increase in salivary pH. As the human clinical evidence is limited, future research needs to define the actual magnitude of health benefits, establishing the safe range of tea consumption to advocate green tea for prevention and treatment of specific oral morbidities. Infusion of green tea in mouthwashes, tooth paste antiseptic creams promotes the usage of green tea.

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**Conflict of interest:**none

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