

A Review on Green Tea (camellia sinensis)

Swapnil Wadkar, Tejaswini Gurud, Sneha Kanse, Sagar Kale, Akash Balid, Darshan Wagh, Pragati Padole, Abhishek Bhosale, Tejas Narawade, Sanket Fulari

Arihant College of Pharmacy

ABSTRACT

Tea is one of the most widely consumed beverages worldwide, and is available in various forms. Green tea is richer in anti-oxidants compared to other forms of tea. Tea is composed of polyphenols, caffeine, minerals and trace amounts of vitamins, amino acids, and carbohydrates. The composition of tea varies depending on the fermentation process employed to produce it. The phytochemicals present in green tea are known to stimulate the central nervous System and maintain Overall health in humans. Green tea phytochemicals are a potent source of exogenous antioxidant candidates that could nullify excess endogenous ROS (reactive oxygen. species) and RNS (reactive nitrogen species). Inside the body, and thereby diminish the impact. of photoaging Green tea Supplementation increases the collagen and elastin Fiber content, and Suppresses collagen degrading enzyme MMP-3 production in the skin. conferring an anti-wrinkle effect. This describes the reported anti-photoaging. Stress resistance and neuroprotective and autophagy properties of one of the most widely known functional Foods - green tea.

Keywords: Green tea, Oral health, Antioxidant properties, Antimicrobial effect, Anti-inflammatory effects, Oral microbiome, Gum inflammation. Preventive dentistry, Oral care products, Natural oral health solutions, Antibacterial properties, green tea antioxidant.

INTRODUCTION

Plants are a powerful medicinal resource, and numerous studies on the therapeutic value of plants have been conducted some plants have the potential to be developed into anti- Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) therapeutic agents one plant that has been used since ancient times for medicinal purpose is tea (Camellia Sinensis), Scientific evidence Suggests that tea has many health benefits which have been attributed to the presence of polyphenols contained in green tea leaves. white, yellow, green, black, oolong and dark teas are among the different types of tea currently prepared for the consumption.



Historically, people in the western world more commonly prefer black tea, whereas people in Asia commonly prefer green tea. However, green tea has recently gained global popularity due to reports that green tea Contains more naturally preserved polyphenols (class of compounds. found in many plant foods that includes flavonoids, phenolic acids, lignans Green tea provides a wide range of health benefits. Including antiviral, antibacterial, and anti-inflammatory activities. Green teas has also been reported to decrease the risk of cancer and improve brain function. In addition to neuroprotective, antianxiety, cardiovascular disease preventive, cholesterol-reducing, antiarthritic, and antiangiogenic impacts. Green tea extracts contain various quantities of polyphenols (45%-90%) and caffeine (0.4%-10%).The major flavonoids are found in greater amounts in green teas than in black or oolong teas.

Green tea polyphenols have antiviral properties mediated through a variety of mechanisms, which is essential during a pandemic situation, as researchers are racing to find treatments against coronavirus disease 2019 (COVID-19)

Types of Teas

Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

- i Green Tea: It is prepared from unfermented leaves compared to the leaves of oolong tea which are partially fermented and black tea which are fully fermented. Green tea is rich in varieties of beneficial chemicals with maximum positive effects on human beings.
- ii Black Tea: It accounts for approximately 72 % of the world's total tea production. While most of the EGCG antioxidants are oxidized during the fermenting process, black tea retains a high number of the antioxidant polyphenols such as flavonoids. These antioxidants help rid the body of harmful toxins.
- iii White Tea: The buds and young tea leaves are collected shortly before the buds have fully opened. Then the leaves are steamed and dried with the minimum amount of processing. For this reason white tea retains the greatest levels of antioxidants and the lowest levels of caffeine than any other tea from the *C. sinensis* plant (green, black or oolong).
- iv Oolong Tea: Oolong tea is a partially fermented tea and has the flavour and health characteristics of both green and black teas. It contains a high number of antioxidants, which protects healthy skin cells and the aging process slows down.
- v Pu'erh Tea: This type of tea comes from a large leaf variety of tea plant and can be picked any time of the year. Its processing is similar to that of black tea. What makes this tea unique is that once it is picked, it is piled and aged for as long as 50 - 100 years.

Green Tea Types

- i Matcha -powdered green tea.
- ii Sencha- loose leaf green tea.

A strong culture of tea drinking exists in Japanese society which is manifested in the form of tea ceremony. Matcha and Sencha are two varieties of green tea commonly used among the Japanese population.

Both Forms of green tea are derived from the Same plant Species. *Camellia sinensis*, however, their textures and Flavors are vastly different.

Sencha is made from tea plants that have been exposed to the sun all year, whereas matcha is made

from tencha, which come from plants that have been cultivated in the shade for 30 days of harvesting.

Objective

The objective of green tea in oral health is to leverage its antimicrobial, anti-inflammatory, and antioxidant properties to promote healthier teeth and gums. Green tea helps reduce harmful bacteria, prevent plaque formation, reduce gum inflammation, and protect against tooth decay and bad breath. Additionally, it may support the prevention of oral diseases such as gingivitis and periodontitis, contributing to overall oral hygiene and long-term oral health.

Methodology

The methodology of using green tea in oral health typically involves various approaches to incorporate its beneficial properties into daily oral care routines. Here are the common methods:

1. Consumption of Green Tea:

- Drinking Green Tea:- Consuming unsweetened green tea regularly can help deliver the active compounds, such as catechins and polyphenols, directly to the mouth. These compounds work to inhibit bacterial growth, reduce plaque, and lower the risk of gum disease.

- Brewing Strength and Frequency: The concentration of catechins depends on the brewing time and temperature. Typically, steeping the tea for 3-5 minutes at around 75-85°C (167-185°F) maximizes the antioxidant content.

2. Green Tea Mouth Rinse:-

- Mouthwash Preparation:- Green tea extract or brewed green tea can be used as a natural mouthwash. The mouth rinse helps reduce oral bacteria, freshen breath, and reduce gum inflammation. Typically, the tea is cooled before use.

- Frequency: Rinsing with green tea can be done once or twice a day, after meals or before bedtime, to improve oral hygiene.

3. Green Tea Toothpaste and Dental Products:-

- Green Tea-Infused Toothpaste:- Some toothpaste brands incorporate green tea extracts to enhance anti-plaque and anti-inflammatory effects. These products target the prevention of tooth decay and gingivitis by combining fluoride with the benefits of green tea.

- Green Tea Dental Products:-Other oral care products, such as mouthwashes or dental gels containing green tea extract, are formulated to provide concentrated benefits for oral health.

4. Green Tea Chewing Gum:

Chewing Gum with Green Tea Extract:- Some chewing gums are infused with green tea extracts, promoting salivation and reducing plaque formation, while providing antimicrobial effects during chewing.

5. Topical Application:

Green Tea Extract Gel or Paste:- In some cases, green tea extracts are applied topically to inflamed gums or areas prone to infection, helping reduce inflammation and bacterial load.

6. Clinical Studies:

- Experimental Designs: In clinical studies, researchers often compare the effects of green tea with traditional oral hygiene practices (e.g., brushing and flossing) to assess its impact on plaque reduction, gingival inflammation, and overall oral health. These studies typically measure variables like plaque index, bleeding on probing, and bacterial count before and after intervention with green tea.

- Formulations and Concentrations: Studies vary in the type of green tea used (fresh, extract, or specific catechins) and the concentration or dosage (e.g., tea brewed at varying strengths or extracts with specific catechin content).

By integrating green tea into oral health routines, individuals may benefit from its proven antimicrobial, anti-inflammatory, and antioxidative properties, which help maintain and improve oral hygiene.

Uses and effectiveness.

Anti-diabetic Effect: In Type II diabetes, which is a heterogeneous disorder, there is resistance of glucose and lipid metabolism in peripheral tissues to the biological activity of insulin and insulin secretion by pancreatic β cells is inadequate. In a study, administration of Green Tea polyphenols (500 mg/kg) to normal rats, there was an increase in glucose tolerance significantly at 60 minutes. Serum glucose levels was also reduced in alloxan diabetic rats at a dose of 100 mg/kg. For 15 days continuous administration of the green tea extract at 50 or 100 mg/kg daily, it produced 29% and 44% reduction, respectively, in the elevated serum glucose level produced by alloxan administration .

Anti-viral Effect: EGCG and ECG were found to be potent inhibitors of influenza virus replication in cell culture. This effect was observed in all influenza virus sub-types tested, including A/H1N1, A/H3N2 and B virus. Quantitative analysis revealed that, at high concentration,

EGCG and ECG also suppressed viral RNA synthesis in cells, whereas

EGC failed to show a similar effect. Similarly, EGCG and ECG inhibited the neuraminidase activity more effectively than the EGC. Neuraminidase is an antigenic glycoprotein enzyme found on the surface of the influenza virus. Neuraminidase has functions that aid in the efficiency of virus release from cells.

Cardiovascular Disease: Cardiovascular disease(CVD) is a complex disorder involving multiple factors. Among those factors are inflammation, oxidative stress, platelet aggregation, and lipid metabolism. Some of these factors are also involved in other disease processes, but will be discussed in this paper under CVD. There have been a number of studies over the years assessing green tea consumption in respect to CVD risk 52. Consumption of green tea is associated with lower risk of heart disease and stroke. Research published by Harvard demonstrates that people who drink at least one cup of tea daily have a 44 percent lower risk of heart attack. Green tea also dramatically increases the antioxidant capability of blood, which protects the LDL cholesterol particles from oxidation, which is one part of pathway towards heart disease. Women who consumed five or more cups per day had 31 % lower risk of dying from cardiovascular disease and stroke.

A Sexually transmitted infection that can lead to genital warts or cancer (Human papillomavirus or HPV).

- Green tea daily might have a lower risk of death from heart disease.
 - cancer of the lining of the uterus (endometrial cancer). Drinking green tea is linked to a reduced risk of developing endometrial cancer.
- Ovarian cancer - Regularly drinking tea green seems to reduce the risk of ovarian cancer.

Special precautions and warnings

- Drinking green tea may make anemia worse.
- The caffeine in green tea might make anxiety worse.
- (Osteoporosis) - Drinking green tea can increase the amount of calcium that is flushed out in the urine. This might weaken bones.

Ranking brand products for green tea in the market -

- Lipton Honey Lemon CGreen tea.
- Te - A. Me Honey Lemon Green Tea.

- Tetley Green Tea Lemon and Honey Tea.
- Vahdam Lemon Ginger green tea.

Green tea is often touted for its health benefits, but like any food or drink, it has both advantages and disadvantages.

Advantages of Green Tea:

- Rich in Antioxidants:** Green tea is high in polyphenols, particularly catechins like EGCG, which are potent antioxidants that help protect cells from damage and reduce inflammation.
- Supports Heart Health*:** Studies have shown that green tea may help lower LDL cholesterol levels, reduce blood pressure, and improve overall heart health.
- *Aids Weight Loss*:** Green tea can boost metabolism and increase fat-burning, which may aid in weight loss, especially when combined with exercise.
- *Improves Brain Function*:** The caffeine and L-theanine in green tea work together to improve focus, memory, and alertness, potentially enhancing cognitive function.
- *May Reduce Cancer Risk*:** Some studies suggest that the antioxidants in green tea may help reduce the risk of certain types of cancer, though more research is needed.
- *Improves Skin Health*:** Green tea's antioxidants can help reduce signs of aging and protect skin from UV damage.
- *Boosts Immune System*:** Green tea has antiviral, antibacterial, and antifungal properties that may help boost immunity.

Disadvantages of Green Tea:

- *Caffeine Sensitivity*:** While green tea contains less caffeine than coffee, it can still cause jitteriness, insomnia, or heart palpitations in sensitive individuals.
- *Tannin Content*:** Green tea contains tannins, which can interfere with iron absorption, especially if consumed in large quantities.
- *Stomach Irritation*:** Drinking green tea on an empty stomach may cause nausea or discomfort in some people due to its acidity and tannin content.
- *May Interfere with Medications*:** Green tea can interact with certain medications, particularly blood thinners, stimulants, or drugs for hypertension, so it's important to consult a doctor before regular consumption.

5. ***Excessive Consumption Risks*:** Drinking too much green tea (more than 5-6 cups a day) can lead to liver damage or other side effects due to the high levels of certain compounds, like catechins, which can be toxic in large amounts.

6. ***Tooth Staining*:** Like other tea types, green tea can cause staining of teeth over time.

In summary, green tea can be beneficial for health if consumed in moderation, but like any beverage, it's important to be mindful of individual sensitivities and interactions with medications.

CONCLUSION

Overall, green tea can play a positive role in supporting oral health. Its antimicrobial, anti-inflammatory, and antioxidant properties make it a valuable addition to your daily oral care routine. However, it should not be seen as a substitute for regular brushing and flossing but rather as a complementary measure for better oral hygiene.

REFERENCE

- T.B Emran M.A. Rahman, effects of organic extracts and their different fractions of five Bangladeshi plants on in-vitro thrombolysis. Vol. 15. no.1, Page No. 128 (2015).
- Babu, P. V. A., Sabitha, K. E., & Shyamaladevi, C. S. (2006). Therapeutic effect of green tea extract on oxidative stress in aorta and heart of streptozotocin diabetic rats. *Chemico-biological Interactions*, 162(2), 114-120. <https://doi.org/10.1016/j.cbi.2006.04.009>
- Chacko, S. M., Thambi, P. T., Kuttan, R., & Nishigaki, I. (2010). Beneficial effects of green tea: a literature review. *Chinese Medicine*, 5(1), 1-9.
- Aanouz, I., Belhassan, A., El-Khatibi, K., Lakhlifi, T., El-Ldrissi, M., & Bouachrine, M. (2021). Moroccan Medicinal plants as inhibitors against SARS-CoV-2 main protease: Computational investigations. *Journal of Biomolecular Structure and Dynamics*, 39(8), 2971-2979. <https://doi.org/10.1080/07391102.2020.1758790>
- Eberhardt, M. V., Lee, C. Y., & Liu, R. H. (2000). Antioxidant activity of fresh apples. *Nature*, 405(6789), 903-904. <https://doi.org/10.1038/35016151>
- Elmezayen, A. D., Al-Obaidi, A., Şahin, A. T., & Yelekçi, K. (2021). Drug repurposing for coronavirus (COVID-19): in silico screening of

- known drugs against coronavirus 3CL hydrolase and protease enzymes. *Journal of Biomolecular Structure and Dynamics*, 39(8), 2980-2992. <https://doi.org/10.1080/07391102.2020.1758791>.
7. Enmozhi, S. K., Raja, K., Sebastine, I., & Joseph, J. (2021). Andrographolide as a potential inhibitor of SARS-CoV-2 main protease: an insilico approach. *Journal of Biomolecular Structure and Dynamics*, 39(9), 3092-3098. <https://doi.org/10.1080/07391102.2020.1760136>.
 8. Fisher, G. J., Wang, Z., Datta, S. C., Varani, J., Kang, S., & Voorhees, J. J. (1997). Pathophysiology of premature skin aging induced by ultraviolet light. *New England Journal of Medicine*, 337(20), 1419-1429. <https://doi.org/10.1056/NEJM199711133372003>
 9. Gardner, E. J., Ruxton, C. H. S., & Leeds, A. R. (2007). Black tea—helpful or harmful? A review of the evidence. *European Journal of Clinical Nutrition*, 61(1), 3-18. <https://doi.org/10.1038/sj.ejcn.1602489>
 10. Katiyar, S. K. (2003). Skin photoprotection by green tea: antioxidant and immunomodulatory effects. *Current Drug Targets-Immune, Endocrine & Metabolic Disorders*, 3(3), 234-242. <https://doi.org/10.2174/1568008033340171>
 11. Rietveld, A., & Wiseman, S. (2003). Antioxidant effects of tea: evidence from human clinical trials. *The Journal of Nutrition*, 133(10), 3285S-3292S. <https://doi.org/10.1093/jn/133.10.3285S>
 12. Wierzejska, R. (2014). Tea and health—A review of the current state of knowledge. *Przegl Epidemiol*, 68(3), 501-6.
 13. Wilson, D. (2018). The Japanese tea ceremony and pancultural definitions of art. *The Journal of Aesthetics and Art Criticism*, 76(1), 33-44.

HOW TO CITE: Swapnil Wadkar, Tejaswini Gurud, Sneha Kanse, Sagar Kale, Akash Balid, Darshan Wagh, Pragati Padole, Abhishek Bhosale, Tejas Narawade, Sanket Fulari, *Int. J. Sci. R. Tech.*, 2024, 1 (12), 24-28. <https://doi.org/10.5281/zenodo.14283062>