

Review Article

Refocus on Potential Health Benefits of Tea

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Abstract: Tea is a potent and divine herb, having well known medicinal value. Tea is widely consumed beverage in the world. Since its discovery about 5000 years ago, tea has been a subject of intensive research. As tea contains important antioxidant nutrients (such as flavonoids and polyphenols) vitamins and minerals, it offers health advantage, participates in various physiological activities and protects the cell against the toxic effects of free radicals which reflects its role in suppression of oxidative stress mediated disorders such as aging, cardiovascular disease and cancer etc. Various researches are going on to explore the hidden facts about its role in health and diseases. However, the exact mechanism behind its involvement in such events is not yet fully elucidated and needs further investigation. Tea rarely produces any toxic side effects even at high intake. It's protective properties and safety profile makes it an attractive therapeutic tool. Therefore, the present article is focused on the current aspects related to health benefits of tea intake with special reference to free radicals mediated diseases.

Keywords: Antioxidants, Aging, Cardiovascular disease, Antiobesity, Anti-inflammatory

INTRODUCTION

Nutrition and health are intimately linked, has been known since ancient times. The vital importance of tea to health mainly due to its antioxidant contents has been now well recognized. Tea was first discovered by the Chinese around 5000 years ago. Tea is a member of *Camellia* family (*Camellia sinensis*) an evergreen tropical plant originates indigenously from both India and China. Its taste and character depends on the area in which it is grown, the type of soil, the altitude and climatic conditions. Tea is not only wonderful beverage but also a food or vegetable. The tea can be classified into three basic types: black, green and oolong [1]. Green tea is brewed from the unfermented dried leaves of *C. sinensis*, whereas Oolong tea and Black tea are produced from partially fermented or completely fermented *C. sinensis* leaves, respectively, and contain approximately half catechin content as compare to green tea [2]. Tea is widely used beverage in the world. Without addition of milk and sugar, it has no calories or fat. Although previous studies have reported about the role of tea as a potent divine herb used as a family drink, the emerging evidences reflect the importance of

tea as an effective medical therapy in a wide array of conditions including cardiovascular diseases, cancer prevention and oral hygiene etc. The area covered in this review has been rapidly unfolding in recent years and emphasizes the potential role of tea in maintaining health and in prevention of free radical mediated diseases linked to oxidative stress.

COMPOSITION OF TEA

Tea is probably one of the most surprising source of beneficial plant nutrients. Tea has hardly any calories or fat. Generally in India, tea is usually consumed with milk either along with sugar or without sugar. Tea contains traces of proteins, carbohydrates, amino acid and lipids but has more important quantities of vitamins, minerals (Ca^{2+} , Zn^{2+} , K^+ and low Na^+) and antioxidants. (Table 1) The antioxidants present in the tea are flavonoids, polyphenols and saponins. Moreover, caffeine is present in very low quantity in tea which has no any adverse affect on health. However, it increases alertness, concentration and mental performance.

Table 1: Nutrients provided by 650 ml. of tea with milk (skimmed).

<u>Nutrients</u>	<u>Amount provided</u>	<u>Nutrients</u>	<u>Amount provided</u>	
Energy	48 kcal	Vitamins & Antioxidants	Thiamin (B ₁)	0.07 mg
Protein	3.41 gm		Riboflavin (B ₂)	0.27 mg
Carbohydrate	4.77 gm		Vitamin (B ₆)	0.07 mg
Fat	1.36 gm		Folic acid	0.02 mg
Minerals			Flavinoids	200 mg/ cap
Potassium	300 mg		Quercetin	
Calcium	109 mg			
Zinc	0.68 mg			
Manganese	in traces			

ROLE OF TEA IN HEALTH AND DISEASES

The health benefits of tea (both green and black) can be attributed to the presence of antioxidants i.e. flavonoids and polyphenols, and minerals such as zinc, potassium and manganese (Table 2) which are important component of antioxidant enzymes and plays a crucial role in scavenging of free radicals.³ Free radicals are highly reactive molecules and cause damage to the cell components viz. inactivate enzymes, oxidize lipids and damage genetic material (DNA), membrane ion transporters and proteins leading to development of disease process. Antioxidants help to prevent and repair these damages. There are various evidences which confirm that tea intake inhibits lipid

peroxidation and subsequent decrease in oxidative stress. These effects enhances the body antioxidant potential and shed light on prophylactic action of Tea against cardiovascular disease, cancers and other age related disorders.⁴ Moreover, the daily intake of tea offers some other health benefits by prevention of kidney stone formation and constipation, by facilitating digestion as it helps the stomach muscles and body’s digestive juice to work better and by maintaining kidney function normal via its diuretic action. In addition, tea is excellent beverage which replaces not only lost body fluids but also provides refreshment after exercise [1]. Green tea may elevate some side effects of radiation treatment and chemotherapy.

Table 2: Links between Tea contents and Oxidative stress.

Antioxidant nutrients:
Flavinoids e.g. Quercetrin: scavenges free radicals and inhibits lipid peroxidation.
Polyphenols e.g. Epigallocatechin gallate: putative Anti-inflammatory and antioxidant activity Rosmarinic acid: scavenges free radicals and inhibits lipid peroxidation.
Potassium : Scavenges superoxide anion, normalizes blood pressure
Zinc : Constituent of superoxide anion (CuZnSOD)
Manganese : Mn SOD, scavenges free radicals
Riboflavin : Glutathione reductase (FAD), decreases cell fragility, inhibits free radical mediated damages.
Thiamine : Required for transketolase in Pentose phosphate pathway.
Folic acid : Minimizes level of plasma homocysteine - high levels are a risk factor for heart disease perhaps by oxidative damage to the vascular endothelium.

Anti inflammatory and antioxidant role:

Inflammation is a pathological condition characterized by mononuclear immune cell infiltration (monocytes, macrophages, lymphocytes, and plasma cells), tissue destruction and fibrosis. In our previous studies we have observed that inflammation process exerts its deleterious effects on cells leading to disease development through messenger molecules such as cytokines, prostaglandins and chemokines [5]. In addition, cellular side effects caused by inflammation are mainly through excessive production of free radicals and depletion of antioxidants. Tea flavonoids are potent antioxidants that are absorbed from the gut after consumption. Tea consumption consistently ameliorates

antioxidant capacity of the blood, reduces oxidative damage of important biomolecules and regulates the formation of proinflammatory cytokines. Moreover, Epigallocatechin gallate (EGCG), a major polyphenolic compound present in green tea, have putative anti-inflammatory and antioxidant properties in multiple cell types. By virtue of these properties, it has been demonstrated in various studies that EGCG have therapeutic benefit in numerous inflammatory diseases such as atherosclerosis, arthritis, and dry eye disease [6,7].

Anti aging effect:

The aging process has been shown to result in an accelerated functional decline [8]. The exact mechanisms that cause this functional decline are unclear. Several previous evidences suggest a causative role of reactive oxygen with age. According to free radical theory of aging, cumulative damage by free radicals combined with decreased repair capacity contribute to aging. In this context, antioxidants contents of tea i.e. phytochemicals scavenges the free radicals and thereby delay aging process as well as age related processes[9].

Cardio protective effect:

Polyphenols and flavonoids, are the natural antioxidant mainly present in Tea having well known cardioprotective effect. These antioxidants also reduce blood clotting and deposition of cholesterol in the blood vessels. It has been observed in various researches that consumption of tea decreases the risk of developing heart diseases not only by their cholesterol lowering action but also by decreasing systolic blood pressure [10]. In addition, the role of tea in increasing antioxidant levels of blood plasma may be attributed to its cardioprotective action. Imai and Nokachi also observed that the risk of heart attack in people who drank one or more cups of tea a day was about half that of those who drank no tea [11]. These studies reflect the need of further research to reduce the events of cardiovascular disease.

Anti-carcinogenic action:

In previous studies regarding the anti-carcinogenic action of Tea, it has been observed that tea may protect against the development of pancreatic and prostate cancer [12]. Flavonoids and polyphenols contents of tea may decrease the risk of cancer by stabilizing the free radicals and by limiting the blood vessel growth around the tumor cells thereby inhibiting their growth. Researches on Tea also indicate that Tea may have a role in changing the genes responsible for developing cancer. Although relationship between tea consumption and reduced incidence of cancer has been documented, the mechanism behind its anti-carcinogenic activity needs further research.

Role in Oral hygiene:

In addition to its prophylactic action against heart disease and cancer, Tea also plays an important role in maintaining healthy tooth and proper oral hygiene. The fluoride, one of the important constituent of tea, has been observed to exert a positive effect in preventing tooth decay and gum disease. Tea also improves oral health by preventing dental caries. In a clinical trial, chemopreventive effect of drinking tea by improving oral precancerous mucosa lesion has been well documented. Beneficial effect of drinking tea in inhibiting plaque (scale) formation, caused by mouth

bacteria that leads to gum disease, has been attributed to synergistic action of antioxidant and fluoride content of tea [13].

Role in Oral cancer prevention:

Shin for the first time had shown that green tea extract have dose-dependent effects in a clinical chemopreventive setting (oral premalignant lesions). This translational trial provide important data on angiogenesis and other biomarkers on which to base future clinical research, which should include trials of green tea extract or polyphenols combined with other natural or synthetic compounds to enhance chemopreventive effects [14].

Antiobesity role:

Obesity is a state of excess adipose tissue mass. Previous studies have suggested that all-cause, metabolic, cancer, musculoskeletal disorders and cardiovascular morbidity begin to rise at a slow rate when body mass index (BMI) increases above 25 [15]. Green tea contains an array of polyphenolic compounds including catechinsepicatechin-3-gallate (ECG), epigallocatechin (EGC), epicatechin and catechins, which have putative antiobesity effects. Recently, Rains *et al.* reported that catechins present in green tea exerts antiobesity effect by not only by affecting sympathetic nervous system (SNS) activity but also by increasing energy expenditure and promoting the oxidation of fat. In addition, Caffeine, naturally present in green tea, also influences SNS activity, and acts synergistically with green tea catechins to increase energy expenditure and fat oxidation. Other potential mechanisms include modifications in appetite, up-regulation of enzymes involved in hepatic fat oxidation and decreased nutrient absorption [16].

CONCLUSION

Considering the therapeutic role and health benefits of tea, we conclude that Tea is amazing health drink which reduces hypertension, lowers plasma cholesterol enriches blood, increase appetite, promotes digestion, increases antioxidant activity in blood plasma, protects teeth against decay and bacterial action and decreases the risk of heart disease and cancer etc. Beyond all health benefits, tea spins a magic that keeps the family together. Therefore, daily consumption of Tea is essential for maintaining healthy life and it should be consumed to the people of all age group. In addition, more research is needed to explore the hidden facts about the prophylactic action of tea.

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