

Beneficial Properties of Tea on the Overall Human Health: A Review

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ABSTRACT

One of the highly famous beverages in the world is tea that is known to be product of *Camellia sinensis* plant buds and leaves. The classification of tea is broadly done on the basis of method used for its production such as oolong tea (half fermented), pu-erh tea (post fermented), black tea (fully fermented), and green tea (unfermented). China and Japan are the countries where most consumed tea is green tea whereas in the remaining world, including India and western countries, the tea that is consumed on primary basis is black tea (Suzuki et al., 2016). In the ancient times, it was believed that several health aids could be cured successfully with the help of tea on account of its impact as medicinal remedy. These health ailments include body pains and aches, improvement in immunity, headaches, digestion, headaches, in the form of energizer, and for the purpose of detoxification and prolonging life. It is stated in several ancient texts that tea has the miraculous power of treating many health related problems. The content of natural anti-oxidants is high in tea that makes it highly effective for managing esophageal, colon and lung cancers in addition to dental caries, urinary stone etc (Sharma et al., 2007). This study is focused on impact of tea on different systems of human body and how it offers benefits to the overall health. The origin of interest in health benefits of tea is on account of the anti-oxidant tea polyphenols present in high amount in black tea and green tea. The focus is on role of these polyphenols in reducing the risk of several diseases including cancer and heart related problems.

Keywords: Anti-oxidants, Tea Consumption, Flavonoids, Polyphenol, Catechin

ACTION OF TEA AS ANTI-CANCER ANTI-OXIDANT

It is found in many studies that the anti-oxidant property of tea is on the account of phenols present in it. It contains phenolic acids and catechins having more power compared to the anti-oxidant vitamins E, C etc. The studies have also revealed that anti-oxidant properties of tea are contributed by presence of theaflavins and catechins in tea fraction (Afaq et al., 2004). The content of phenol in green and black teas does not have any significant difference and they also have comparable anti-oxidant potential and anti-oxidant strength as per phenol anti-oxidant index. This index is even higher than that present in wines and grape juices. Anti-oxidant property that is bound by powerful lipoprotein is exhibited by green tea, black tea and tea catechins (Katiyar, 2003). Tea contributes the anti-oxidants that form a great source of diet rich in anti-oxidants.

Tea leaves extracts are also available in the form of dietary supplements and with the rise in its popularity; scientists

are also investigating health properties of tea and its non-cancer impact (Cooper, Morré and Morré, 2005). It is found that unique catechins are present in green tea possessing biological activity in anti-angiogenesis, anti-oxidant and anti-proliferative assays. These are known to have powerful impact for treating cancer of several forms. The anti-oxidant and anti-cancer properties of tea are due to characteristics that are not related to one another in any form. It is also found that stress levels could be reduced significantly with the help of theanine present in green tea. Even the levels of blood cholesterol could be reduced with the help of oxidized catechins presents in tea (Troup et al., 2015). Not just this, tea is also known to offer anti-aging benefits and this is the reason why it is also gaining popularity in the topical preparations while the further aspects of its benefits are still under survey.

STRESS AND ANXIETY MOOD

With increasing popularity of the many health benefits offered by tea, studies have also been conducted to find whether tea can have benefits for stress levels as well. For this purpose, presence of oxidative stress natural marker, that is, erythrocyte malondialdehyde is tested. As per the results, it became evident that malondialdehyde levels are reduced significantly with tea catechins presence. The studies have also revealed that remarkable protection is offered by tea catechins against oxidative stress so that one can stay away from anxiety.

BILE ACID AND GUT

Tea is not just limited to the above mentioned benefits. It is also beneficial for bile acid and gut. The polyphenols in green tea have shown wonderful impacts on the structure of gut microbiota and conversion of energy. Standard methods of calibration were used for quantifying the metabolites in these studies. The gut microbiome was found to be altered significantly that suggested several health benefits including vitamin production elevation, calorific carbohydrates reduction, altered amino acids metabolic patterns and decreased levels of calorific carbohydrates. It is found that altered metabolism connected with gut microbial might

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How to cite this article: Moina Sharma, Sushil Singh, Kishore Kumar Soni. Beneficial Properties of Tea on the Overall Human Health: A Review. International Journal of Contemporary Medical Research 2022;9(7):G1-G4.



significantly contribute to the anti-obesity function of body (Zhou et al., 2018).

BLOOD CHOLESTEROL

The polyphenolic flavonoids present in tea possess anti-mutagenic, anti-oxidant, anti-allergenic and anti-inflammatory properties. As per the cell culture, the impact of these flavonoids might be hypocholesterolemic as well. Such reviews on impact of tea have revealed the fact that favorable effects are there of tea on the risk factors of cardiovascular diseases such as hypercholesterolemia. This led to caution that results of such studies must be interpreted carefully for getting exact figures. Several factors are there that originate while considering impact of black tea on the levels of blood cholesterol. These also include the dietary habits of the participants, methods used by them for the purpose of tea brewing, strength of the tea and habitual consumption of tea on an average. These might remain same or change in different studies that accounts for the impact of black tea consumption on blood cholesterol levels.

CARDIOVASCULAR SYSTEM

While tea serves to be the most popular beverage in the world, two of its highly consumed varieties are black tea and green tea. The reason is that both these forms act as flavonoids rich dietary sources. As per the studies conducted and evidences available from these, it is believed that cardiovascular disease risk is reduced to great extent with consumption of tea on regular basis. Flavonoids are mainly responsible for these health benefits related to cardiovascular system of human body offered by tea consumption. With several hit and trials, it is now a proven fact that status of oxide could be improved with the help of tea flavonoids and the endothelial function could also be enhanced. All these factors lead to the improvement in cardiovascular system (Stensvold et al., 1992). Beneficial impacts have been observed on body fatness and body weight as well while the oxidative damage is reduced along with blood pressure, activation of platelet, inflammation and type 2 diabetes risks with flavonoids present in tea.

CENTRAL NERVOUS SYSTEM

It is already established that properties of tea that are known for promoting health are credited to the presence of active ingredients in them such as polyphenols. The flavonoids present in tea are natural polyphenol group that are present in most of the varieties of tea. When there are several therapeutic benefits of these, the impact is also exclusive on living beings neural health. In the same manner, it is reported that green tea is rich in the polyphenols that are known to prevent degradation of neuronal extensively with inhibition of formation of neurotoxin in the cells. It was also established that some forms of neurodegenerative diseases could also be cured with it on account of the chelating property. In similar way, it was also found that catechins in green tea can offer protection from most of the products of glycation end. Immense impact was noted of green and black

tea varieties for protecting against the diseases. Along with this, the bidirectional property of antioxidation also helps in the prevention of oxidative variation occurrence in the cellular components including lipids, nucleic acids, proteins etc. The membrane lipid peroxidation is initiated when these components are oxidized in the aqueous phase. In addition to this, such tea polyphenols are soluble in water and therefore are found to have potential of scavenging the versatility of free radicals in the structures of lipids (Singh, Tyagi and Agarwal, 2019). The polyphenols coat phospholipids bilayer by entering in it and the impact is balanced with adjustment in the ability of pressing lipids. The amount of metal particles that are dynamic chemically is also higher in them that leads to the formation of oxygen radicals.

The effects are notable on account of presence of hydroxyl ions on metal chelating polyphenol ring. The important structures of lipid are protected by black and green tea chelating effects that also helps in reducing the levels of stress. Tea is rich in phytochemicals that help in prevention of mitochondrial layer division against lipid that is induced by iron per oxidation. This is shown to improve the rate of survival in many studies. It is therefore considered that several neurological disorders could be prevented easily with tea on account of its property of metal chelating.

In the Alzheimer disease, one of the important causes is free chelatable iron in irregular contact that leads to the deposition of metals and neocortical amyloid peptide, tangles formation and tau phosphorylation due to tau protein production from the microtubules.

ROLE ON INFERTILITY

For the purpose of counteracting the oxidative stress in infertility and human reproduction, green tea is considered as the favorable option on account of its components that have beneficial effects on quality of gamete. For the couples suffering from problem of infertility, the effect of extract from green tea seems rational when taken orally. Female and male genital tracts have low concentrations of reactive oxygen species present in them. When the levels of ROS are excess in body, they result in oxidative stress that has damaging impact on proteins, lipids and DNA. Vitality is compromised due to these changes in molecules while the sperm motility is decreased in males along with increase in the morphological defects. In the case of females, oocyte maturation is interfered by oxidative stress and the oocyte in-vitro maturation might be inhibited by this. The studies have revealed the fact that supplementation of green tea possess some of the properties with which the female and male gametes quality could be highly improved (Roychoudhury et al., 2017). This is on the account of ROD quenching ability present in the catechin polyphenols. It is therefore considered that reproductive health might be offered with several benefits by green tea on account of the unique properties present in it.

ANTI-OBESITY ACTIONS

In the studies conducted to find the impact of green tea on the antiobesity actions in body, it was found that weight of

adipose tissue was reduced by green tea while no impact was there on intakes of water and food and weight of body and the other tissues. The free fatty acids and cholesterol plasma levels were also reduced significantly by green tea. The anti obesity action of green tea is on account of were on account of the fact that it helps in reducing the uptake of glucose while glucose transporter translocation is also decreased in the adipose tissue. The glucose uptake with translocation of GLUT4 in skeletal muscle is stirred notably with this (Ashida et al., 2004). In other words, it means that system of glucose uptake is modulated by green tea in skeletal muscle and adipose muscle while the activation or expression of transcription factors that are adipogenesis related is also suppressed.

ROLE DURING PREGNANCY AND LACTATION

The metabolism in newborns and fetuses is found to be influenced by the maternal nutrition at the time of intrauterine development. This is possible with the exertion of epigenetic modifications that can create alteration in phenotype that has impact on fetus development (Hachul et al., 2018). This mechanism is termed as metabolic programming. Plant *Camellia sinensis* is the one from which green tea is derived and high content of polyphenols is present in this. in the catechins like epicatechin, epigallocatechin and epigallocatechin-3-gallate, the one having most abundance is the latter.

Antioxidative roles are possessed by such components that are bioactive in nature. They are able to increase the oxidation of fat, lower the body mass and deposits of fats, enhance the expenditure of energy, improve activity of insulin and help in metabolism upregulation. When saturated fatty acids rich hyperlipidic diet is consumed, the endotoxemia is increased and it helps in the contribution to systematic inflammation by which proinflammatory cytokines secretion is induced with TLR-4 activation.

ANTI COAGULATION PLATELETS

The method known as polyamide column chromatography is used for preparing EGC from the polyphenols of tea. For this purpose, different dosage of tea was investigated and a control group made comparison for the same. In these studies, it was found that significant inhibition is there on the aggregation of platelets along with proper ratio of inhibition. The time of bleeding in groups under investigation was prolonged for significant duration along with the time of clotting of blood. The EGC dosages have found to enhance time of activated partial thromboplastin to significant levels but the time of prothrombin was not impacted. These factors indicated that coagulation factor decrease level is not attributed to EGC anticoagulation like fibrinogen. It was therefore established that significant antiplatelet activity is there of EGC along with anticoagulation of blood in the manner that is dependent on dosage (Chen et al., 2013).

SKIN BENEFITS

Most of the topical applications make use of extracts from

plants for the purpose of treatment of diseases, anti-aging and wound healing etc. All these plants that are used for medicinal properties are known to have compounds of flavonoids with phenolic structures as the common substance present in them. The high reactivity of these phytochemicals helps in free radicals neutralization while initiating biological effects. Catechins is the polyphenol compounds group having health beneficial promising properties. These are found in green tea and this is the reason why it is found in many studies that green tea offers several skin benefits. These include anti aging, natural healing, anti-cancer properties etc. Along with photoprotection and anti-cancer protection, benefits for other skin related problems are also offered by tea flavonoids (Mukhtar, Katiyar and Agarwal, 1994).

All these studies have indicated to the fact that tea is responsible for several health related benefits and this is the reason why consumption of this beverage is popular from ancient times. People now and then love to consume tea in any of its available forms. The population that is found to consume tea on consistent basis is found to have improved health functions while several ailments were warded off from their body. Acetyl cholinesterase activity could also be inhibited with tea consumption on regular basis as suggested by one of the many studies conducted to find the different benefits of tea on systems of human body. It is also good for brain when either black or green tea is consumed on consistent basis.

The different components present in tea are responsible for either reducing the activities that can cause problem for human health or for inducing the properties in body that can bring several benefits to health in the form of proper functioning of different body systems. It depends on choice whether a person like to consume green tea or black tea or any form of tea since different forms are known to have different health benefits.

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Source of Support: Nil; **Conflict of Interest:** None

Submitted: 25-05-2022; **Accepted:** 28-06-2022; **Published:** 30-07-2022