



## Green Tea: Conventional Facts and its Frontier Prospect on Health- A review

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### ABSTRACT

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Green tea obtained from the leaves of *Camellia sinensis* (L.) Kuntze having potential health benefits. It contains significant amounts of antioxidant and is considered as world healthiest drink. Polyphenols in tea are thought to exhibits anti-carcinogenic and anti-inflammatory effects. Green tea catechins acts as immune modulators in immune dysfunction and also play a role in protection from degenerative diseases. Intake of green tea catechins suppress high fat diet induced obesity, prevent lipid and glucose metabolism disorders and reduce risk of coronary heart disease. Green tea constituent epigallocatechin-3-gallate (EGCG) is a potential antioxidant that shows protective effects against photo toxicity and photo carcinogenesis. In vitro animal experiments have suggested that polyphenols in green tea protect from lung cancer by their antioxidant and antimutagenic properties. This study chiefly highlights the convenience of green tea on health and propagates its further prospects.

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## Introduction

The use of herbs in alternative medicine is quite common (Sevindik et al., 2017; Pehlivan et al., 2018; Mohammed et al., 2019). Plants are used with different methods (Mohammed et al., 2020). Green tea is one of the most widely used herbs around the world. In recent times green tea is the most attractive beverage for its significant health benefits (Cabrera et al., 2006). In 17<sup>th</sup> century green tea was first exported from India to China (Chacko et al., 2010); from that time green has become a traditional medicine in china (Cabrera et al., 2006). Now a day's green tea is cultivated largely in Asia, South America and Africa (Ben and Micheal, 2007). Main catechins in green tea are epicatechin, epicatechin-3-gallate, epigallocatechin and

epigallocatechin-3-gallate (EGCG) (Sano et al., 2001). Green tea is considered as health promoting agent for its higher content of major catechins called epigallocatechin-3-gallate (EGCG) that exhibit biochemical and pharmacological activities (Siddiqui et al., 2006). It also a main source of caffeine that works on the different systems of body (Cavalli and Tavani, 2016). Green tea intake reduces liver diseases (Jin et al., 2008), cardiovascular diseases and also acts as protective agent against various health disorders (Benelli et al., 2002; Weisburger et al., 2002). Hence, the aim of this present review was to assess the overall effects of green tea consumption on health.

## Composition of Green Tea

Green tea contains some special Chemical components like: Proteins (15-20% dry weight), carbohydrates (5-7% dry weight), amino acids (1-4% dry weight) and trace elements (5% dry weight). It also contains trace amounts of lipids (linoleic and  $\alpha$ -linolenic acids), vitamins (B, C, E), sterols (stigmasterol), pigments (chlorophyll, carotenoids), xanthic bases (caffeine, theophylline) and volatile compounds (aldehydes, alcohols, esters, lactones, hydrocarbons) (Belitz and Grosch, 1992). Green tea leaves also contains 3-4% of alkaloids called methylxanthines, such as caffeine, theophylline and theobromine (Graham, 1992).

## Medicinal Importance of Green Tea

Some epidemiological studies suggested the beneficial effects of green tea on human health including anti-obesity, antidiabetic, anticancer, anti-viral, antibacterial and hepatoprotective effects. This findings mainly supported by cell based and animal trial (Suzuki et al., 2012). The medicinal properties of green tea were presented in the following section:

### *Anti-obesity*

Obesity is now a main headache in our population that causes some weight related complications and also develops lung diseases, diabetes, coronary heart diseases, arthritis, metabolic syndrome etc. (Barnes et al., 2004; Adam-Perrot et al., 2006). Some clinical studies have demonstrated the beneficial role of green tea polyphenols on obesity (Schneider and Segre, 2009; Suliburska et al., 2012; Miyoshi et al., 2015). Green tea causes thermogenesis by polyphenol constituents called catechins that stop the breakdown of norepinephrine. This may increase mitochondrial oxidation, and produce heat. Catechins also impair angiogenesis and inhibit the development of adipose tissue (Han et al., 1999; Dulloo et al., 2000). Recent trials on human indicate that green tea or its extract may decrease body weight gaining by increasing postprandial thermogenesis and fat oxidation (Zamboni et al., 2005).

### *Anti-diabetic*

Green tea and its extract have thermo genic properties and promote fat oxidation that modify glucose metabolism and prevent type- II diabetes mellitus (Tsuneki et al., 2004; Wu et al., 2004). Green tea constituent's epigallocatechin-3-gallate (EGCG) is a potential antioxidant that ameliorates cytokine-induced  $\beta$  cell damage and prevents the reduction of islet mass (Song et al., 2003): In a cohort study, among 937 older adults, long term intake of green tea about 1-2 cups/day lower 70% type-II diabetes mellitus (Panagiotakos et al., 2009).

### *Anti-cancer*

From some epidemiological studies, green tea extract possesses some beneficial effects against various cancer (Yang et al., 2009; Yang and Wang, 2016). Based on some case-control and cohort studies that were carried out from 1965 to 2008 a review article suggested that green tea consumption reduce the risk of bladder, colon, breast,

gastric, lung, kidney, ovarian, pancreatic, and prostate cancers (Yang et al., 2009). European prospective investigation into Cancer and Nutrition study revealed that increased tea intake reduced the risk of developing hepatocellular carcinoma (Bamia et al., 2015). In a subgroup analysis of individuals in Western countries, the consumption of tea reduced the risk of bladder cancer (Zhang et al., 2015). Italian research group showed that green tea catechins were safe and highly effective for the treatment of premalignant lesions (Bettuzzi et al., 2006). According to Japan Public Health Center-Based prospective study, green tea intake may decrease the risk of advanced prostate cancer (Sawada, 2017). A stratified analysis revealed that green tea had a protective effect against rectal cancer (Chen et al., 2017).

### *Hepatoprotective*

Liver is one of the key metabolic organs that play a role in metabolism and detoxification process but any disorder of this organ causes serious health problems (Samuel et al., 2012). There are many risk factors for liver diseases. Liver toxicity mainly develops by different types of drug induction (Lee et al., 2005). Different studies observed that green tea helps in lipid metabolism that reduces lipid accumulation in liver. Green tea consumption also offers protective action against malignant change by its polyphenolic antioxidants (Sing et al., 2011). Histological and histochemical changes of liver induced by cyclophosphamide may improve by green tea extract consumption at a dose 50mg/kg/day (Ali, 2018).

### *Others*

Green tea can be employed as supplement for probiotics milk (Najgebauer-Lejko, 2014). Tea leaves produce polyphenolic compounds that involved in protective action against pathogens like bacteria, viruses, fungi and insects (Friedman, 2007). Aqueous extraction of green tea reduce viable fungal cells (Antunes et al., 2015). Green tea polyphenols are beneficial for the prevention of dental carries (Sakanaka, 1997). Green tea extracts also having the capacity of lowering cholesterol level (Bursill et al., 2007; Rehrah et al., 2007).

## Frontier Prospects Regarding Health Issues

We know green tea is a natural diuretic that possess many beneficial effects on health as well as show a promising future as popular drink (Mahmood et al., 2017). But some conflicting results also have been reported. Major constituent of green tea is caffeine. So, excess intake of green tea may cause nausea. Tannins present in green tea that interferes iron absorption causes iron deficiency anemia. Other side effects of excess green tea consumption are vomiting, abdominal pain, loss of appetite, dyspepsia and diarrhea. Excess green tea intake also causes insomnia, vertigo, tremors and psychomotor agitation (Nawab and Farooq, 2015). Oral administration of high doses of green tea extracts causes toxicity (Isbrucker et al., 2006). High doses of green tea catechins associated with prostate cancer (Gontero et al., 2015). Daily intake of green tea causes slight increase in hypertension risk (Chei et al., 2018). Drinking of extreme amounts of green tea (more than five cups /day) can cause urination and lead to dehydration and

electrolyte disproportion. Dehydration can also leads to lethargy, headaches, changed heart rate and distress. So excess green tea intake in a day should be avoided (Nawab and Farooq, 2015).

## Conclusion

Green tea is an excellent worldwide accepted popular beverage. It contains useful ingredients for the improvement of our health condition but excess consumption can show some adverse effects. So people should aware of this regard.

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