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BLACK TEA- THE UNIQUE HEALTH DRINK AND A KEY TO A HEALTHY LIFE

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ABSTRACT

Black tea is consumed as the most popular natural beverage next to water since time immemorial. The purpose of this review focusses on the research output received from various projects funded by National Tea Research Foundation (NTRF) which highlights the putative biological actions of black tea and its components. The research on tea and health reveals that polyphenols present in tea with its quality and therapeutic values make it as a unique beverage which exert different beneficial effects to our health. Evidence from research findings ascertained that black tea, a potent health promoting beverage keeps us healthy. Various epidemiological and clinical studies suggest that black is tea associated with protective role against cancer, diabetes, cardiovascular diseases etc. Tea consumption exert general health promotion.

KEYWORDS: Black Tea, Antioxidant, Theaflavin, Thearubigin, Health Promoting Beverage.

INTRODUCTION

Tea, the most preferred nature's low calorie, flavoured, non-alcoholic, functional, therapeutic wonder drink, is consumed worldwide as second only to water which cares, cures, rejuvenate and boosts internal defence system and keeps us healthy. Tea leaves contain bioactive constituents like polyphenols, amino acids, volatile compounds and alkaloids. These biochemical components show the immense pharmacological properties. This popular drink has been considered as a health promoting beverage since ancient time.

Polyphenolic compounds present in tea attributed the antioxidative property that gives positive effects on health. The fascinating chemical composition of black tea has been gaining importance to the researcher for exploring the beneficial properties towards health.

Major polyphenolic compounds— theaflavins (TF), residual catechins, thearubigins (TR) as well as theanine and caffeine – present in black tea (BT) contribute to colour, distinctive flavour and play significant role both for quality of tea and act as a safeguard against many ailments. Current research on black tea with epidemiological studies and clinical evaluation takes explicitly established the unique therapeutic properties of tea in preventing and protecting a plethora of human diseases.

National Tea Research Foundation (NTRF) under Tea Board of India, has carried out a good number of projects where uniqueness of Indian black tea for protecting different human ailments have been well established. The research findings in different scientific literature strongly support the beneficial role of drinking black tea. The current review will focus on the research output generated from various NTRF funded projects and published in the scientific literature.

Cancer Preventive Effects of Black Tea

Nowadays, one of the leading causes of mortality in developing countries like India is cancer. Cell line and animal model studies funded by NTRF showed encouraging result that black tea particularly its polyphenolic constituents act as an anticancer agent. Functional properties of Indian black tea in comparison with the other tea revealed that Indian tea is superior in quality with respect to teas from the other parts of the world (Pal et al., 2012). Optimum steeping time for black tea preparation to get the maximum health benefit have been reported. Result showed that infusion time and consecutive brewing time should be 10 minutes to achieve the maximum antioxidative activity (Pal et al., 2013).

Tobacco habit is considered as a main etiological factor for developing carcinogenesis in multiple organs. In a population-based study, it was revealed that regular intake of nearly 4 cups of black tea could reduce tobacco carcinogenesis and generation of ROS and DNA damage of oral epithelium of normal population (Pal et al., 2012). Effect of black tea on cigarette smoke induced oxidative damage of proteins both *in vitro* and *in vivo* have been reported. The result on guinea pig model indicates that

tea polyphenol hinders cigarette smoke induced oxidative damage, apoptosis as well as pulmonary emphysema (Banerjee et al., 2007).

Another important study exhibited that black tea of Darjeeling variety has anticancer activity by preventing MMPs (Matrixmetalloproteinases) action and migration of cancer cells (Bhattacharya et al., 2017). Thus, the positive correlation of black tea intake and cancer prevention has been established.

Promising role of black tea with oral cancer has been explored by NTRF funded research. Result showed that black tea is stimulative for oral cancer patients as it can reduce micronuclei percentage, a potent marker of oral cancer and ultimately exert the chemo preventive and therapeutic potential to prevent this disease (Halder et al., 2005).

Another important study with black tea on oral cancer has supported the same as black tea polyphenol immensely reduced the micronuclei number (Adhikari and Dey,2017).

Apoptogenic property of black tea on tumour cells in vivo have been studied. Tea, particularly its polyphenolic component, has emerged as a nontoxic, immunopotent, cancer preventive agent by directly killing the tumour cells without affecting the normal cells (Bhattacharyya et. al, 2003).

Study on black tea flavonoid fractions showed the radio protective effect. This positive result may be used for cancer therapy during or following radiation therapy (Pal et al., 2013).

The unique antioxidant activity of black tea polyphenol, theaflavin showed the positive effect on healing of indomethacin induced gastric ulceration in animal model (Adhikari et.al. 2011). Another study on L-theanine the important amino acid present in tea act as a neuroprotective agent also showed the positive healing effect on NSAID (indomethacin)-induced gastric ulceration in animal model (Chatterjee et al., 2014).

Anticancer and antimutagenic activity of Darjeeling tea extract (DTE) have been explored in a study where it was reported that tea extract promoted antimutagenic aspect on Salmonella strains in bacterial mutagenicity and the inhibitory effect on the viability of the U937 cells. Thus, the significant role of DTE as anticancer and antimutagenic on bacterial and mammalian cells have been established (Bhattacharya et al., 2014).

Effect of Black Tea on Heart Health

Nowadays cardiovascular disease (CVD) is a major healthcare problem globally that leads to a higher mortality rate in developed countries. The therapeutic potentialities of phytochemicals present in tea help to decrease the risk factors associated with cardiac ailments. Epidemiological studies with the population of Eastern India having ischemic stroke and metabolic disorders, revealed that black tea polyphenols give protection from heart disease by reducing important biochemical parameters i.e. C-reactive protein, blood cholesterol levels and also by reducing LDL level and increasing HDL level. Research findings have established that black tea is very much beneficial for heart diseases and have shown that it reduces the recurrence of ischemic stroke. Tea polyphenol rich in antioxidative properties, inhibit the formation of atherosclerotic plaques and significantly improve endothelium dependent vasodilation. This prospective observational study revealed that black tea inhibits atherosclerosis with its antioxidative, antifibrinolytic and hypolipidemic properties (Ghosh et al., 2012). Thus, CVD risk can be reduced by inclusion of tea flavonoids in regular diet.

However, limited evidence suggests tea has favourable effects on cardiovascular diseases. High quality clinical trails are required to confirm this.

Effect of Black Tea on Diabetes

Diabetes is a chronic metabolic disorder that adversely affect majority of the people around the world. Prevalence of this disease is increasing day by day and causes a major burden for the developing countries. Diet plays a very important role in controlling this disease. Drinking this wonder beverage has shown to improve glucose tolerance and increase insulin sensitivity and ultimately help to combat with the disease.

Gomes et al., 1995 have established the anti-hyperglycaemic effect of black tea in vivo. The effect of hot water extract of black tea was evaluated with streptozotocin (STZ) induced diabetic rats. The study explicated the antidiabetic role of black tea by lowering blood glucose level and was found to have both curative and preventive properties on chemically induced diabetes in rats.

Polyphenols present in black tea gives a protective action against metabolic disorders of glucose and lipid associated with type 2 diabetes. Study showed that polyphenols present in tea help for the management of diabetes by inhibiting carbohydrate hydrolyzing enzymes in the digestive organs. Cohort studies at Kolkata have clearly demonstrated that black tea polyphenols exert positive health effects to pre-diabetic and T2 diabetic patients (Roy et al., 2015). Human clinical studies showed the encouraging role of tea flavonoids for controlling glucose metabolism and endothelial function. L-theanine, the important natural bioactive amino acid present in tea and consumed widely which shows an insulinotropic activity and also protects pancreatic β-cells in oxidatively stressed condition. This encouraging finding shows that L-theanine can be used for treatment of diabetes (Saha et al.,2018).

Effect Black Tea on Neurodegenerative Diseases

The antioxidative property of black tea polyphenols protects the cells from oxidative stress and shows the positive actions on different neurological ailments. The neuroprotective role of tea polyphenol mainly exerts from L-theanine an important amino acid present in tea that increases alertness, improve cognitive function and provides overall neuroprotection.

The effect of tea polyphenol on neurological disorder have been investigated. The effect of black tea (TV 25 variety) on colchicine induced Alzheimer's disease (AD) rat was reported. The neuroinflammatory markers, cognitive impairments and certain peripheral immunological parameters were studied. Result showed that black tea was able to recover the cognitive impairments and neuroinflammatory status of AD rats (by reducing oxidative stress, nitosative stress and levels of proinflammatory cytokines like TNF – αand IL - 1β). Peripheral immune responses such as phagocytic activity of blood WBC and Splenic PMN, cytotoxicity of Splenic MNC and leukocyte adhesion inhibition index of Splenic MNC were altered in AD rats but were recovered following administration of black tea. Thus, black tea of TV 25 variety having high polyphenol content and antioxidative potential could combat with the oxidative stress faced by AD rats (Sil et al.,2018).

Effect of Black Tea on Gynecological Disorder

Effect of black tea polyphenols on gynaecological disorder i.e. preeclampsia, a serious disorder during pregnancy have been studied. Beneficial role of black tea extract for the management of the disease has been well documented. During preeclampsia, patients showed enhanced oxidative stress and altered lipid parameters. Black tea was able to exert a positive effect by altering lipid profile and oxidative stress in patients with preeclampsia. Antioxidative role of black tea extract provides a protective action against oxidation of LDL.
Thus, black tea can be utilised as an additive for preeclamptic patients, as a safe guard against oxidative modification of lipid and endothelial dysfunction (Padmini and Usha Rani, 2011).

Effect of Black Tea on Bone Health and Inflammatory Diseases

Rheumatoid arthritis, a chronic painful inflammatory disorder is nowadays a major concern among the older generation throughout the world. Use of plant product for the treatment of this disease has been gaining importance to the researchers. Black tea having immense antioxidant potential possess anti-inflammatory property and keeps bone healthy.

The anti-arthritic effect of Indian black tea has been explored in animal model. Experiment was conducted with the rheumatoid arthritis induced male albino rats. Black tea extract showed anti-inflammatory and anti-arthritic property significantly (Datta et al.,2012).

Theaflavin (TF), the chief flavonoid present in black tea, has also explicated the promising role as an anti-arthritic agent in experimentally induced rheumatoid arthritis rat model. The beneficial role of theaflavin may be useful in bone joint related diseases (Datta et al.,2014).

Study documented that black tea extract plays a significant role to reduce the oxidative stress parameters of rheumatoid arthritis patients. Total oxidative stress and inflammation is controlled by release of pro-inflammatory cytokine by inflammatory cells from patients suffering from rheumatoid arthritis. The potential role of black tea polyphenol suggested that it may be used to control rheumatoid arthritis as add on therapy along with the traditional treatment procedure (Roy Choudhury Majumder et al.,2016).

Effect of Black Tea on Gastrointestinal Disorders

Therapeutic activity of black tea as an antiulcer agent has been studied. Administration of black tea extract to rats for one week inhibited the development of acute gastric ulcer induced by different ulcerogens. Tea extract was found to decline acid and peptic activity of gastric secretion, generated by different ulcerogens (Maity and Ganguly, 1995).

Another interesting study revealed that tea extract augmented gastric glutathione peroxidase, hexosamine and sialic acid content, which may provide the overall improvement of gastric mucosa (Maity et.al., 1998).

CONCLUSION

From the above discussion, it is evident that tea the most popular natural beverage has been considered as a safe drink. The active components of black tea are the major interests for therapeutic purposes as it exhibits a tremendous potentiality to combat different types of human ailments. So, black tea having diverse bio modulatory activities may be a potential candidate to be used as a part of our regular diet and may be considered as a supplement to prevent different types of ailments.

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