International Journal of Tea Science
Vol. 9(2–3) 2013

MINI REVIEW

Black tea as a part of daily diet: A boon for healthy living

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ABSTRACT: Black tea is one of the most popular beverages worldwide. The aim of this review is to summarize the putative biological actions of black tea and its components, to obtain a further understanding of the reported beneficial health effects of these substances. Research in the field of health-related properties of black tea has increased since the studies started showing the low cardiovascular mortality rate in association with its (black tea) consumption. Several other potential beneficial properties of flavonoids have since been ascertained. We review the studies on various components of black tea, the mechanisms by which they act, and the potential benefit of this fascinating natural beverage in preventing disease and promoting healthy life.

KEYWORDS: *Tea; Black; Green; Benefit; Clinical trial*

Introduction

Three main types of tea can be produced based on how the leaves of *Camellia sinensis* are processed: Green tea (non-fermented), Oolong tea (partly fermented), and Black tea (fermented). Black tea is commonly consumed in India, the United States and Western countries. This review will focus on possible beneficial effects of various Black tea components against prevention of chronic diseases like cardiovascular disease, cancer, etc.

Brew prepared from Black tea has a dark brown colour and a sweet aroma. It has stronger flavour than Green and Oolong tea.[1] Black tea without sweeteners or additives contains negligible quantities of calories, protein, sodium and fat. Tea contributes significantly to fluid balance which is vital for physical and mental health.[1] Until about 20 years ago, information on the working mechanisms of various component of Black tea was scarce despite it has been widely known for centuries that black tea possess a broad spectrum of health benefits and has the key to good health, happiness, and wisdom.In many countries, Black tea provides rich dietary sources of flavan-3-ols, flavonols and other flavonoids, yet databases of values for some of these components are non-existent. Creation of databases in future will provide the tool to accurately assess the role of tea in the reduction in risk of chronic disease and improvement of health. However, considerable studies have already been done on components of Black tea reducing risk for cancer, heart disease, type 2 diabetes; encouraging weight loss; lowering cholesterol; and brings about mental alertness.[2–5] Black tea also appears to have antimicrobial property.[6] Studies on experimental systems have revealed that black tea component possess anti-inflammatory, anti-allergic, anti-viral, and anti-carcinogenic properties.[6–8] The aim of this review was to evaluate whether Black tea has clearly emerged as a lead beverage and phytonutrient that needs to be consumed daily as part of diet for healthy living. This review gives an overview of the research work done in the areas of mechanisms of Black tea components in preventing chronic diseases and discusses about the potential benefits of Black tea consumption for human health.

Constituents of Fresh Tea Leaves

Fresh tea leaves contain approximately 36% polyphenolic compounds, 25% carbohydrates (pectins, glucose, fructose, cellulose), 15% proteins, 6.5% lignin, 5% minerals and trace elements (magnesium, chromium, iron, copper, zinc, sodium, cobalt, potassium, etc.), 4% amino acids (such as theanine [5-N-ethyl-glutamine], glutamic acid, tryptophan, aspartic acid) 2% lipids, 1.5% organic acids, 0.5% chlorophyll as well as carotenoids and ethereal substances below 0.1%, vitamins (B, C, E).[9] Catechins and other polyphenols have antioxidant properties.[10] They act as chelators and antioxidants under *in vitro* conditions by sequestering metal ions and by scavenging reactive oxygen and nitrogen species.

Manufacture of Black Tea

Manufacturing of Black tea starts with collection and drying of tea leaf followed by withering. The manufac-

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ISSN: 0972-544X (print)

turing practices play an important role in the development of optimum flavour and quality of tea. The withering process during Black tea manufacturing results in the partial removal of moisture. This step is important for chemical changes and reduction of moisture levels depending on the specific manufacturing process being used. During this process, air is blown through the leaves in order to carry away the moisture. It is important to keep the leaves near ambient temperature because over heating leads to adverse chemical reactions, leading to detrimental effect on the quality. This step is followed by leaf maceration where leaf is cut into small pieces which leads to the disruption in cellular compartments, and the cytoplasmic polyphenol oxidase comes into the contact of substrate, the catechins in monomeric form present in the vacuole.

This is followed by another step called "fermentation", during which the polyphenols are oxidized to form the characteristic compounds of Black tea. The exothermic biochemical reactions occur during this stage. The rise in temperature has to be controlled to prevent any unwanted secondary reactions that may alter the constituents of tea responsible for its quality. Passing of air through the macerated leaf provided temperature control as well as the provision of oxygen required for oxidation process that occurs during fermentation. After fermentation, the moist leaves are dried to arrest the oxidation process. During this process, enzyme reactions of earlier phases are terminated by heat and moisture loss. The drying process is important for some of the flavour characteristics of the final product.

Finally, the leaves are sorted into grades according to their sizes (whole leaf, brokens, fannings and dust), usually with the use of sieves.[11]

Composition of Black Tea

Composition of Black tea solid extract includes: Polyphenolic compounds including catechins in monomeric, dimeric and oligomeric form, other flavonoids (including myricetin, quercetin and kaempferol, etc.); amino acids (including L-theanine); methylxanthines, carbohydrates, proteins, and minerals.[9]

Black tea is also considered as a dietary source of antioxidant nutrients like carotenoids, tocopherols, minerals such as Cr, Mn, Se, or Zn, and certain phytochemical compounds. These compounds enhance beneficial health effects of consumption of Black tea.

Polyphenolic Compounds

Most phenolic compounds found in black tea consist of more than one benzene ring, with each containing at least one hydroxyl group (–OH). Research interest in Black tea has been primarily due to the presence of the flavonoids generally having two aromatic rings, each containing at least one hydroxyl group, which are connected through a three-carbon "bridge" and is a part of six-member heterocyclic ring which are further divided into subclasses based on the connection of an aromatic ring to the heterocyclic ring, as well as the oxidation state and functional groups of the heterocyclic ring. Within each subclass, individual compounds are characterized by specific hydroxylation and conjugation patterns. Health attributes of Black tea are believed to be largely due to the presence of these flavonoids. The most common subclasses of flavonoids in Black tea are non-ketone polyhydroxy polyphenol compounds the flavan-3-ols (catechins in monomeric, dimeric or oligomeric forms) and flavones (quercetin, myricetin, etc.).[12] The fermentation process during manufacturing of Black tea allows the leaves to undergo enzymatic oxidation causing polymerization of flavan-3-ols (monomeric catechins) to a large extent, resulting in formation of dimeric (theaflavins) and oligomeric (thearubigins) forms, that decide the liquor characteristics of Black tea. Studies suggest that Black tea is one of the prominent sources of the flavonol aglycons (3.89–7.08 mg g^{-1}), especially quercetin (2.22–4.17 mg g^{-1}) in the human diet.[13]

Phenolic acids such as gallic acid and cinnamic acid esters of quinic acid are also found insignificantly lower concentrations in tea. Crushing of the tea leaves during manufacture of Black tea leads to enzyme-catalyzed oxidation and polymerization of tea catechins (fermentation).[10] This process results in the formation of dimeric catechins (theaflavins) and oligomers known as "thearubigins", which account for 2–6% and 15–20%, respectively, of the dry weight of the Black tea infusion. Three main types of theaflavins are found in Black tea, namely theaflavin (TF-1), theaflavin-3-gallate (TF-2), and theaflavin-3, 3-digallate (TF-3).[10] Theaflavins are formed *via* the co-oxidation of pairs of epimerized catechin, one with a vic-trihydroxyphenyl moiety, and the other with an ortho-dihydroxyphenyl structure. Theaflavin derivatives reserve two A-rings, two C-rings from their precursor monomeric catechins, and possess a characteristic element of the fused seven-member benzotropolone ring. Studies suggest that the existence of resonance formed in the benzotropolone moiety might be responsible for electron donation and play an important role in affording antioxidant protection for the preferred oxidation

site in the oxidant models.[14] Theaflavins are responsible for bright red or orange colour of brew, and contribute to the unique taste and astringency of black tea.[15] The astringency of Black tea is due to the precipitation of the mucous glycoproteins in the mouth by polyphenols. Thearubigins, which has higher molecular weights, is still poorly characterized chemically. Recently, a strategy combining standard chemical characterization along with a series of modern complementary mass spectrometry techniques has been used to characterize thearubigins. An average of 5000 additional thearubigin components in the mass range between *m/z* 1000 to 2100 has been clearly defined.

Flavonoids of tea brew get extensively modified as they enter gastrointestinal tract.[16] They undergo significant metabolism and conjugation during absorption in the small intestine lead primarily to the formation of glucuronide conjugates that are more polar than the parent flavanol. They are converted to sulphates in the liver. Phase II processes also lead to the production of *O*-methylated forms by enzyme catechol-O-methyl transferase, and these forms have reduced antioxidant potential because of the methylation of the B-ring catechol. Rechner *et al.* have found that Black tea brew in presence of simulated gastric acids significantly increased content of the theaflavins which have smaller structure than thearubigins and therefore more readily absorbed theaflavins.[17] Other significant modification of flavanols occurs in the colon where the resident microflora degrade them to smaller phenolic acids, some of which may be absorbed. Thearubigin are likely to be metabolized by the colonic microflora, and some of its antioxidant effects *in vivo* might be due to phenolic acids produced by microflora present in colon after the breakdown of the parent compound.[18] These low-molecular-weight phenolic acid molecules are readily absorbed and may retain the antioxidant properties of the parent compound.

The polyphenols found in black tea can not only scavenge reactive oxygen nitrogen species and chelate redox-active transition metal ions, but may also function as antioxidants through their ability of inhibiting of the redox-sensitive transcription factors present in the cell. It also inhibits enzymes such as inducible nitric oxide synthase, lipoxygenases, cyclooxygenases and xanthine oxidase which promote oxidation; and induces antioxidant enzymes, like glutathione-S-transferases and superoxide dismutases.[1]

Polyphenols of Black Tea and Cardiovascular Disease

The prevalence of coronary heart disease (CHD) is rapidly increasing in India, probably as a result of the lifestyle, which includes a diet high in saturated fats and low physical activity, resulting in dyslipidemia, diabetes related to obesity and hypertension. Studies in experimental animal models showed the preventive effect of Black tea against atherosclerosis.[19] Epidemiological studies have revealed that consumption of Black tea is associated with prevention of atherosclerosis and heart disease. Black tea consumption has also been shown to reduce the risk of high blood cholesterol and high blood pressure.[20] A study also showed of Green tea enriched with Black tea theaflavin resulted in significant reductions in LDL cholesterol.[21] Thus, consumption of Black tea polyphenols can influence antioxidant capacity plasma, and these results satisfy oxidative hypothesis of atherosclerosis where LDL oxidation is a key step in the atherogenic process. Consumption of black tea also results in decrease in C-reactive protein, a promising marker of coronary heart disease and associated inflammation.[7] The endothelium is a major regulator of vascular homeostasis and arterial tone, thrombosis, the composition of the arterial wall, and local inflammation. Reports suggest that Black tea components improve endothelium-dependent vasodilatation.[22] Mechanistic studies have also revealed that Black tea polyphenols had favourable effects on platelet aggregation[23] and cell cycle, and this might account for potential of Black tea in preventing cardio-vascular diseases.

Polyphenols and Diabetes

Type II diabetes is a heterogeneous disorder that involves resistance of glucose and lipid metabolism in peripheral tissues to the biological activity of insulin and inadequate insulin secretion by pancreatic β-cells. This disease has skyrocketed worldwide in recent decades. Statistical relationship between Black tea consumption and Diabetes has been evaluated.[24] Principal component analysis established a very high contribution of the Black tea consumption parameter on the third axis with the correlation circle confirming that the Black tea intake (vector) was negatively correlated with the diabetes vector. Linear correlation model has confirmed a significant statistical correlation between high Black tea consumption and low diabetes prevalence. Research indicates that Black tea polyphenols could act as preventive agents and could have a beneficial effect against lipid and glucose metabolism disorders associated with Type II diabetes. The mechanisms may be related to pathways, related to the modulations of energy balance, endocrine systems,

food intake, lipid and carbohydrate metabolism and the redox status.[25,26] Black tea polyphenols reduced the absorption of fatty acids, cholesterol, and starches from the intestinal tract, which can reduce the amount of nutrient absorbed. Theaflavins and thearubigins, the dimeric catechins specially found in Black tea, can mimic insulin action on proteins known as foxos, the forkhead box O transcription factors involved in the regulation of the cell cycle, apoptosis and metabolism. These compounds help to improve insulin signaling and glucose control that can shield against the damaging effects of excess sugar in blood. The elements of the plasminogen activator system, plasminogen activator inhibitor-1 (PAI-1) plays an important role in human diseases. PAI-1 is overexpressed in obesity and diabetes. Recent reports suggest theaflavins from Black tea inhibit PAI-1, and this pathway may also partially account for beneficial effects of Black tea on diabetes.[27] Thus, consumption of Black tea could play a part in curbing one of the most widespread maladies (Type 2 diabetes)related to unhealthy lifestyle.

Polyphenols and Obesity

Obesity continues to be a major public health issue for modern generation. Obesity is often a result of a very small positive energy imbalance between dietary intake and energy expenditure. Theaflavins exhibit a number of pharmacological actions in cells, which have implications for enhancing metabolic rate. Black tea also contains some native (unoxidized) catechins.[10]

Black tea extracts have exhibited anti-obesity and hypolipidemic effects[28] in experimental studies. Studies indicated that Black tea polyphenols stimulated lipolysis in the adipose tissue that was partially responsible for inducing weight loss. Black tea enhanced vasodilatation and blood flow[29] in human subjects that might have implications for lipolysis. Studies have documented that Black tea ingestion reduces triacylglycerol inhuman subjects carrying specific alleles. Gallic acid present in Black tea extract suppressed food intake in animal model. Mechanistic studies further reveal that theaflavins, modulated AP1 (activator protein 1), a nuclear binding protein (transcription factor), responsible for weight loss. It also inhibits I kappa B kinase (IKK),[30] an enzyme activity that plays a major role in obesity.

Polyphenols and Cancer

Epidemiological studies have suggested that food habit greatly influences the risk of developing cancer. Investigations have revealed how individual components of the diet interact at the molecular level to determine the fate of a cell. The results of these studies indicate that people consuming diet rich in flavonoids have lower incidences of cancer.[31] Experimental studies have revealed that anti-oxidative and anti-inflammatory properties[6,7] appear to contribute to the chemopreventive activity[8] of flavonoids. Black tea is one of the flavonoid-rich beverages having diverse biomodulatory activities, and therefore, may be a good candidate as a safe and potential agent in preventing cancer. Its safety for regular consumption and the fact that Black tea is not perceived as medicine have enhanced its potential as chemopreventive and health-enhancing beverage that may find widespread and long-term use in consumers. Apart from antioxidant and free-radical scavenging activity of polyphenols in black tea,[32] initial mechanistic studies regarding the cancer preventive effects of Black tea polyphenols largely focused on induction of apoptosis, protection against mutagenicity and genotoxicity. It also inhibited tumour initiation, tumour promotion by trapping activated metabolites of carcinogens and had positive effect on detoxification enzymes. The COX-2 signaling pathway is important in cancer because it stimulates many key steps in cancer development, including cell division, inhibition of cell death, angiogenesis (the creation of new blood vessels to nourish growing tumours) and metastasis. Theaflavins, in particular, efficiently regulate gene expression, reduce the activity COX-2 at both mRNA and protein level.[33] Theaflavin impedes metastasis by induction of p53 inhibiting NF-κB.[34] Studies suggest both theaflavin and thearubigin augment expression of p19, p21 and p27, while ablating cylcin-dependent kinase (CDK) 2, CDK4, CDK6 and cyclin D1 levels in cancer cell line.[35] Further mechanistic work to define the preventive effects of polyphenols in Black tea against cancer needs to be pursued keeping in mind the bioavailability of these compounds.

Polyphenols and Oral Health

Periodontal disease is a serious bacterial infection, in which the gums and bones that support the teeth become seriously damaged. Tea can be used as a natural cure for periodontal disease. Random surveys have reported that Black tea reduces the incidence of dental cavities.[36] Polyphenols in tea inhibit bacterial growth and wards off mouth infections, thereby inhibiting the growth of plaque-causing bacteria apart from inhibiting the action of salivary amylase, thus making their contribution in cavity prevention.

The antimicrobial activity of tea[6] is probably due to their ability to form a complex with extra-cellular and

soluble proteins, which binds to bacterial cell wall. More lipophilic flavonoids may also disrupt microbial membranes.[37] Flavonoids lacking hydroxyl groups on their β-rings are more active against micro-organisms and the microbial target in the membrane with –OH groups. Polyphenols can form heavy soluble complexes with proteins and may bind to bacterial adhesions, thereby disturbing the availability of receptor on the cell surface.

Other mechanisms that might be responsible for antimicrobial effect of tea include inhibition of topoisomerase (topoisomerase I and II), which are enzymes that control the changes in DNA structure by catalyzing the breaking and rejoining of the phosphodiester backbone of DNA strands during the normal cell cycle.[38]

Although not yet conclusive, there is a growing amount of evidences identifying tea's potential for oral health benefits. However, it is rationale to conclude that drinking Black tea, without the addition of sugar, is compatible with dietary advice to prevent dental decay, thereby helping to promote overall health of an individual.

Polyphenols and Other Chronic Diseases

Consumption of Black tea, a flavonoid-rich beverage, is associated with a lower incidence of neurodegenerative diseases[39] by inhibiting fibrils. The dietary flavonoids present in Black tea provide health benefits in chronic diseases associated with ageing by acting synergistically, through its antioxidant antiviral, antibacterial and anti-inflammatory responses.[6,7,40] Ca^{2+}–ATPases, the important calcium-regulating proteins involved in the cellular calcium homeostasis, are adversely affected during chronic diseases and ageing. Biological ageing leads to oxidation and nitration of Calcium ATpases at Cys and Tyr residues.[41] Polyphenolic compounds found in Black tea can bind directly to Ca^{2+}–ATPases, thus changing their conformation, resulting in modulation of its enzyme activity. Telomere shortening is thought to be another major cause of senescence. Theaflavins through its molecular interactions with the stored genetic material of the cells protects telomere from decay.[42]

Studies have also shown that flavonoids found in Black tea decreased the risk of rheumatoid arthritis.[43] These flavonoids strongly inhibit multiple components of the inflammatory process, including the Cyclooxygenase enzymes that are targeted by NSAIDs.[43] Experimental studies with synovial cells have shown that although the flavonoids do not have an effect on the production of pro-inflammatory proteins, it directly reduces inflammation in the synovium as well as the activation of pro-inflammatory cells.[44] The incidence of asthma was lower when intakes of total flavonoid was higher.[45] This association was due to quercetin, an important flavonoid found in tea. Allergic reactions occur when some foreign protein (chemical, pollen, undigested food particle, etc.) enters the bloodstream and triggers the release of histamine and serotonin, which cause coughing, breathing difficulties, clogged sinuses, skin eruptions, etc. Flavonoids in Black tea stabilizes the walls of the cells that contain histamine and serotonin (mast cells and basophils) and prevents the release of these chemicals. The dosage of flavonoid intake should be divided into equal portions and taken throughout the day. Leukotrienes, another compound having major role in asthma, are derived from arachidonic acid, located in the cell membranes. These compounds cause the bronchial tissue in the lungs to constrict; making normal breathing impossible. Quercetin can block the formation of leukotrienes. Polyphenols in Black tea kill and surpass cavity-causing bacteria as well as hinder the growth of bacterial enzymes that form the sticky-like material that binds plaque to our teeth. Among all dietary sources, tea has the highest concentration of alkylamines (30–50 mg kg^{-1}), with ethylamine as the major component. Germs also contain alkylamines. So, when tea is consumed, T cells begin to recognize alkylamines better and this gives them a primer to also recognize and destroy germs helping in boosting of immune response. In addition, it also contains tannins that have the ability to fight viruses and hence keep us protected from influenza, stomach flu and other such commonly found viruses in our everyday lives.

Bioavailability of tea polyphenolic compound is low because of their short *in vivo* half life (max. 5 hrs) therefore, repeated intake of tea throughout the day is an excellent way of maintaining high plasma level of antioxidants.

Methyl-Xanthine Alkaloids

Methyl xanthines are molecular compounds found in Black tea that act as cardiac stimulants, diuretics, and smooth muscle relaxants. It is a common perception that methyl xanthine containing drinks cause a net loss in fluid and may lead to dehydration. An extensive review of the scientific literature by Maughan and Griffin[46] concluded that tea consumption did not produce a diuretic effect unless the amount of tea consumed at one sitting contained more than 300 mg of caffeine (equivalent to six or seven cups of tea). Later on, another study by Scott *et al.*[47] corroborated with this theory. Caffeine acts mainly upon the central nervous system, stimulating wakefulness, facilitating ideas association and decreasing the

sensation of fatigue .

While the most commonly known form of methyl xanthenes is caffeine, other methylxanthines found in trace amount in tea is theophylline. Some of the effects caused by caffeine are influenced by theophylline content in tea. Theophylline induces psycho activity, it also has vasodilator effect. Theophylline in tea can act as bronchodilators and can stimulate respiratory system and act inotrope in patients with pulmonary disease and provide them short-term relief. This adds to the enormous evidence that tea can make a contribution to a healthy lifestyle.[48]

L-Theanine

L-Theanine (γ-glutamylethylamine) is another important compound unique for tea accounting for almost 50% of its aminoacid content and responsible for its unique "brothy" taste. Study suggests doses similar to those found in a cup of tea did induce changes in alpha waves as shown by EEG (electroencephalogram). Alpha waves occur in the brain and are associated with relaxation. It is known for considerable neuroprotective effects and cognition enhancing properties, assists in brain function development, i.e. central nervous system maturation.[49]

Rejuvenating Effects of L-Theanine

Researchers have found that L-theanine enhances the formation of gamma-amino butyric acid. Gamma-amino butyric acid blocks the release of the neurotransmitters (dopamine) and serotonin to promote a state of deep relaxation and calm, while increasing sensations of pleasure. L-theanine has also been found to directly stimulate the production of alpha brain waves, which are associated with deep states of relaxation and enhanced mental clarity. Studies support that L-theanine enhances tranquility, which opens up the possibility of future benefit for studying the effect of tea on anxiety disorders. Studies suggest that L-theanine could increase the effectiveness of certain chemotherapy medications[50] and may decrease some of the side-effects of such medications. Consumption of L-theanine, which is an important component found in Black tea, may help in acclimatizing body to stress (physical or psychological), and help people lead to a life in more relaxed mental state.[51] L-Theanine can decrease the cortisol response to exercise, which might aid in body building. Although many of these studies suffer due to a number of limitations, it is important that L-theanine exerts positive role in alertness and calmness in synergy with caffeine after consumption of black tea.[52]

L-Theanine in Neurological Disorders

Glutamate-activated signals not only affect mood, but they affect memory and learning also. Memory and learning are similar biochemical processes in the brain. If an animal cannot remember, it cannot learn. Stroke, Alzheimer's disease, and alcohol all cause memory loss, involving disruptions in glutamate-related signals that inhibit the storage and retrieval of memories.

L-theanine can reduce the damage caused by stroke.[53,54] Maintaining healthy levels of L-theanine and other tea-related compounds in the body may thus help prevent memory loss and stroke-induced damage to brain tissue. Inhibitory effect of L-theanine, on Aβ1-42-induced neuronal cell death, an important event in Alzhiemers disease causing memory impairment have been studied.[55] L-theanine treatment reduced Aβ1-42 levels and the accompanying Aβ1-42-induced neuronal cell death in the cortex and hippocampus of the brain. Moreover, L-theanine inhibits Aβ1-42-induced extracellular signal-regulated kinase (ERK) and p38 mitogen-activated protein kinase as well as the activity of Nuclear Factor κB (NF-κB). L-Theanine also significantly reduces oxidative protein and lipid damage and the elevation of glutathione levels in the brain.[56] The positive effects of L-theanine on memory might result in the reduction of macro-molecular oxidative damage preventing neuronal apoptosis that is important for learning and memory capabilities.

L-Theanine and Alcoholic Liver Disease

Alcohol is converted to a toxic chemical known as acetaldehyde, which is similar to formaldehyde and more toxic than alcohol itself. The remarkable capabilities of L-theanine to intercept, nullify free-radicals and acceleration of the breakdown of acetaldehyde have been demonstrated in some studies.[57] The probable mechanism behind its ability to reverse damage caused by alcohol lies in restoration of glutathione. Depletion of glutathione in vital organs like the liver is a major cause of chemotherapy toxicity. Researchers are at present focusing on studies related to the addition of L-theanine to chemotherapy. Glutathione can be enhanced by consuming Black tea, in daily diet which might help healthy as well as diseased person the propensity to restore antioxidant balance in the body.[58]

Concluding Remarks

Dietary components influence prevalence of morbidity and mortality due to chronic disease. To prevent this,

more amounts of antioxidants should be consumed in daily diet, which is readily available in a simple cup of Black tea. Although fruits and vegetables are an important part of a healthy living and weight loss plan, some fruits contain sugars that add calories to diet, and certain vegetables contain starches which are converted to sugar, thus adding up calories. However, tea the natural beverage also provides amino acids that are beneficial to health without adding up the calorie in diet. It could be advisable to encourage the regular consumption of Black tea – a widely available and inexpensive beverage – as an interesting alternative to other beverages, which do not have the health benefits as that of Black tea.

Tea is not only popular, but also economical and considered a safe drink which is enjoyed daily by millions of people all across the world. However given the high consumption of tea worldwide, further study on potential health effects of tea is justified. Definitive conclusions on the effectiveness of tea in maintenance of health and prevention of chronic disease will have to come from well-designed interventional and observational epidemiological studies.

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