

White Tea a Day Keeps Disease Away: A Review



Harshal A Pawar*

Assistant Professor and HOD, Dr. L. H. Hiranandani College of Pharmacy, India

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*Corresponding author: Harshal A Pawar, Assistant Professor and HOD (Quality Assurance), Dr. L. H. Hiranandani College of Pharmacy, Ulhasnagar - 421003, Maharashtra, India, Tel: +91-8097148638; Email: hapkmk@rediffmail.com / harshal.dlhcop@gmail.com

Abstract

White tea is a rare tea that is obtained from the same plant (*Camellia sinensis*) as green, oolong and black tea. It is derived from silvery buds and young leaves of the plant. The leaves are hand-picked, steamed and dried without further processing. It is the least processed tea among all the teas available in the market. Minimum processing result in the preservation of high amounts of phytochemicals that confers many health benefits. This present review provides a general overview of the origin, processing, phytochemistry and the potential health promoting benefits of white tea.

Keywords: White tea; Antioxidants; Catechin; Polyphenols

Introduction

Nutraceuticals have received considerable interest because of their presumed safety and potential nutritional and therapeutic effects. Pharmaceutical and nutritional companies are aware of the monetary success taking advantage of the more health-seeking consumers and the changing trends resulting in a proliferation of such value-added products aimed at heart health to cancer.

Tea is one of the most popular beverages worldwide. Tea has been used as medicine for centuries [1,2]. Now modern science is discovering what people in China and throughout the world have long known that the tea is good for us. White tea is the least processed tea and has the highest antioxidant levels [3]. Originating from and predominantly produced in southern China, it was virtually unknown to the western world until the late 1800s.

The plant *Camellia sinensis* (Family: Theaceae) yields white, green and black tea [4]. White tea is an unfermented tea made from young shoots of *Camellia sinensis* protected from sunlight to avoid polyphenol degradation. Being the least processed tea, white tea has the high total polyphenol content. Its supreme power is in preventing disease and disorder. White tea protects against cancer, heart disease, and stroke, the leading causes of death in

the industrial world, as well as numerous other conditions. There are four main varieties of white tea which includes Silver Needle, White Peony, Long Life Eyebrow, and Tribute Eyebrow [5,6]. The present review provides a general overview of the origin, processing, phytochemistry and the potential health promoting benefits of white tea.

Process of Preparation of White Tea

White tea is made from the buds of the tea plant. Unlike black or green tea, white tea is not rolled, and only slightly oxidized, making it the least processed tea. White tea belongs to the group of tea that does not require panning, rolling or shaking. Plucking of young tea leaves with much fine hair can produce good-quality white tea. The leaves and buds are allowed to wither in natural sunlight before they are lightly processed to prevent oxidation or further tea processing. It is steam dried quickly after the leaves are picked- there is no oxidation at all. Because there is no oxidation, it contains the most anti-oxidants and catechins, the least caffeine, and has a pale colour with a delicate, sweet taste. This tea is pale yellow or green in color [7,8]. The simplified steps of processing of white tea are summarised in Figure 1.

Fresh tea leaf → Withering → Drying (air / solar / mechanical drying) → White tea

Figure 1: Steps of processing of white tea.

The dried leaves and buds used for preparation of white tea and the tea preparation prepared thereof is depicted in Figure 2 & 3.



Figure 2: White tea preparation.



Figure 3: Dried leaves and bud of white tea.

Chemical Composition of White Tea

The main constituents of tea include proteins, polysaccharides, polyphenols, minerals and trace elements, amino and organic acids, lignin's, and methylxanthines (caffeine, theophylline, and theobromine). White tea contains about 3.35-5.74 % of caffeine, 16.23-25.95% of Polyphenol's, 0.06-1.44 % of flavanol glycosides, and 7.94-16.56 % of catechins. The major phenolic compounds present in tea leaves are catechins (also known as flavan-3-ols) and their derivatives, which constitute up to 30% of their dry weight. The chemical structure of Catechin is depicted in Figure 4.

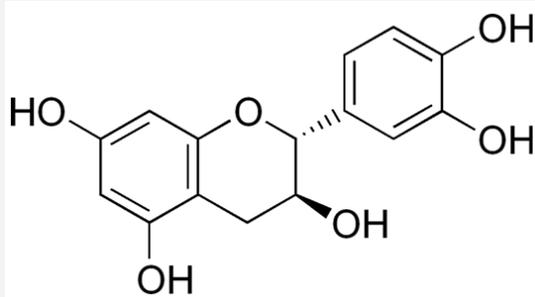


Figure 4: Chemical structure of Catechin.

The main catechins present in White tea are: (-)-epicatechin (EC), (-)-epigallocatechin (EGC), collectively known as

flavanol monomers, (-)-epicatechin 3-gallate (ECG), and (-)-epigallocatechin 3-gallate (EGCG) (Figure 2), which are flavanol gallates [9-13].

Comparison of Different Types of Teas

The comparison of white tea with green and black tea is represented in Table 1 [3,8].

Table 1: Comparison of white tea, green tea and black tea.

Parameters	White Tea	Green Tea	Black Tea
Caffeine Content/ Serving (Approximately)	15mg	40mg	20mg
Total Polyphenols / 100g	16.23-25.95	13.7-24.7	8.3-24.8
Preparation Procedure	No fermentation	Short fermentation	Long fermentation
Taste	Sweet	Sweet after bitter	Bitter
Colour	Pale yellow	Green or yellow	Red or black

Biopotential/Health Benefits of White Tea

The health benefits of white tea are summarized as below:

1. Tea catechins effectively reduce cholesterol absorption from the intestine, lowering the solubility of cholesterol and enhancing the faecal excretion of cholesterol and total lipids. It lowers bad cholesterol Low density lipoprotein (LDL) while enhances the levels of High density lipoprotein (HDL). Thus, it reduces hypertension, thereby prevents arteriosclerosis and improves heart and cardiovascular health [14,15].
2. Numerous studies have demonstrated that tea catechins and polyphenols are effective scavengers of physiologically relevant reactive oxygen nitrogen species (RONS) *in vitro*, including superoxide, peroxy radicals, singlet oxygen, peroxyxynitrite and hypochlorous acid. It is good for cardiovascular and circulatory systems [16,17]. It prevents heart strokes mainly due to the elimination free radicals due to its antioxidant property [18,19].
3. Cancer is generally considered as uncontrolled cell division that results in the aggregation of cells to form tumours. It is one of the major causes of death in the modern world and has shown to be a largely preventable disease, highly susceptible to modulation by dietary factor's [20]. Flavonoids, another group of antioxidants found in white tea, are known to block the formation of carcinogenic cells and as such it prevents the cancerous growth in prostate, colon, intestine and stomach. Polyphenols present in tea may play an important role in prevention of cancer by decreasing DNA damage in the cell and reducing the activation of cancer that leads to malignancy [21]. Catechins also protect cell

membranes against oxidation, keep RONS in confined zones and probably block cell membrane receptors required for cancer cell growth. The initiation of carcinogenesis can be overcome by the repression of some catalytic activities and of other specific enzymes involved in cancer initiation [22,23].

4. Diabetes mellitus (DM) is an increasingly common, potentially devastating, expensive, treatable but incurable lifelong disease. White tea is more likely to lower stress and glucose levels in the blood and helpful for increasing metabolism. Published reports show that numerous extracts obtained from plants are effective in reducing glycemia, causing fewer side effects and with lower cost than the usual antidiabetic agents. Recently, White tea was reported to have strong lipolytic and antiadipogenic activity in vitro. Hence, white tea may demonstrate antidiabetic effect by reducing oxygen species (OS) and hyperlipidaemia followed by insulin resistance. Since diabetes mellitus is increasing worldwide as is associated with several complications, there is a large interest in finding an effective therapy and white tea seems to be a good alternative. Furthermore, in-depth investigation is needed to fully understand the mechanisms of action of white tea against this disease [24,25].

5. Tea also exhibits some antimicrobial properties, which are attributed mainly to its polyphenols. The degree of this activity depends on the bacterial species and the polyphenol structure. The antimicrobial activity of nonfermented tea is higher than that of semi-fermented or fermented tea. Moreover, the highest antimicrobial activity occurs in samples with the highest total polyphenol concentration and antioxidant activity [26-29]. The presence of tiny amounts of fluoride improves the health of gums and teeth by destroying bacteria [30].

6. White teas have been reported to possess higher antielastase, anti-collagenase, and antioxidative activity than certain green tea, suggesting its ability to promote strong and elastic skin and alleviate inflammation and rheumatoid arthritis [31]. It enhances the density of bones and prevents joint pains, softening of bones, and arthritis.

7. Although there are many proposed genetic and environmental factors that predispose individuals to weight gain, the fundamental cause of obesity is an imbalance between dietary intake and energy expenditure. The mechanisms of action of tea in obesity are: stimulation of hepatic lipid metabolism; inhibition of lipases; stimulation of thermogenesis; modulation of appetite; and synergism with caffeine. Simple tea drinking may have easier acceptance by the patients than prescription drugs, exercise and bariatric surgery. The main attractions of tea as an anti-obesity agent are that it is a more natural and safer alternative, there is no need for professional supervision and it is readily accessible and affordable [32-37].

8. White tea strengthens immune system as the antioxidants act against viruses and bacteria [38-40]. As it flushes out free radicals, it also improves skin health and slows down aging process.

Recent Findings on White tea

Recent research findings reported in the literature are summarized below [41]:

1. The anti-viral and anti-bacterial effect of white tea is greater than that of green tea.
2. The anti-viral and anti-bacterial effect of several toothpastes including Aim, Aqua fresh, Colgate, Crest and Orajel was enhanced by the addition of white tea extract.
3. White tea extract exhibited an anti-fungal effect on both *Penicillium chrysogenum* and *Saccharomyces cerevisiae*.
4. White tea extract may have application in the inactivation of pathogenic human microbes, i.e., bacteria, viruses, and fungi.

Conclusion

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 white tea. Studies have shown that two to four cups of white tea per day yield great health benefits. Although a great deal of information has been accumulated on the effect of tea on cancer, a clear understanding of the mechanism by which tea components may affect the genesis, growth, and progression of specific cancers is essential. The bioavailability of tea polyphenols following tea consumption by the human population, studies on the absorption, distribution, and metabolism of green and black tea polyphenols in animals and humans are of utmost importance. It will be beneficial to carry out more research and long-term clinical trials in this promising area as tea is a common drink for many in many countries on a daily basis.

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