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TEA AND CAFFEINE EFFECT ON HEALTH: THE REVIEW PAPER

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ABSTRACT

Tea is the second most popular drink in the world after water and is one of the most drank beverages globally. The leaves, buds, or fragile stems of Camellia plants are used to make it. Secondly The biggest daily tea drinkers (~540 mL) are people living in Europe, primarily in Great Britain. According to EFSA, a cup of brewed black tea can contain 40–45 grams of caffeine. The most often utilized psychoactive drug is thought to be caffeine. Tea, coffee, beverages, and chocolates are just a few of the foods that contain caffeine. The gastrointestinal tract absorbs caffeine quickly and almost entirely, entering the bloodstream. The body's whole absorption of caffeine is easily distributed. Adenosine receptors are specifically blocked by caffeine, which also competitively reduces adenosin's function. impact on well-being Coffee's effects on behavior and mood, Coffeine and Exercise Performance, decreased chance of diabetes and coffeines impact on diet.

KEYWORD: Tea, Caffeine, Dose, Effect, Antidiabetes.

INTRODUCTION

Tea is the second most popular drink in the world after water and is one of the most drank beverages globally.[1] The leaves, buds, or fragile stems of Camellia plants are used to make it.[2] The biggest daily tea drinkers (~540 mL) are people living in Europe, primarily in Great Britain. All people in the globe, however, drink about 120 mL of tea a day on average.[3] Green tea, oolong tea, and black tea are the three main varieties of tea.[4] For thousands of years, people of all ages have made it a regular which has been enjoyed widely around the world.[2] According to EFSA, a cup of brewed black tea can contain 40–45 grams of caffeine.[5] Interesting and encouraging findings from the meta-analysis of epidermiological research indicate that consuming four

cups or more of tea a day, regardless of variety, may lower the risk of type 2 diabetes by 20%.[6]

The biological functions of main secondary metabolites in tea.[7]

Caffeine:- Cardiotonic agent, Anti-fatigue, Vasodilation, Improve attention.

Polyphenol:- Antitumorigenesis, Antioxidant activity, Anti-cancer, Anticardiovasculardisease.

Free Amino Acid:- Sleep peacefully, relievetension, Decrease blood pressure concentration and learningability, Anti-obesity.

Polysaccharides:- Scavenging free radicals, Immunostimulatory activity, Anticancer T, Antidiabetes.

Table No. 1: Black Tea Composition.[8]

Compounds	Black tea(% wt/wt solid)
Caffeine	3
Catechin	9
Theaflavin	4
Simple polyphenol	3
Flavonols	1
Other polyphenols	23
Theanin	3
Amino acid	3
Peptide/proteins	6
Organic acid	2
Other carbohydrates	4
Lipids	3
Other methylxanthines	<1
Potassium	5
Other minerals /ash	5
Aroma Trace	

History

Emperor Shen Nung is credited with inadvertently discovering tea in 2700 BC. One day, he was sitting in the backyard with a cup of hot water after a big supper. During that moment, some leaves from a neighboring tree dropped into the cup. He drank the beverage without noticing it. The habit of drinking tea was formed since he thought the beverage tasted great and helped a lot with the discomfort he was experiencing at the time.[9]

Fig no 01:- Tea Leaves.

- During the fourth century, or 650 AD, the Chinese tea business is said to have emerged during the "T Sang dynasty."
- Scholars have disagreed over the tea bush's origins. Its native range extends from the border of Assam to the interior of southern China.
- The single species of tea is known as Camellia sinensis.
- After tea plants were found in Assam in 1823, the tea business in India was born. Indian tea was first discovered in Assam in 1823, which was the year the industry began.
- By 1596, the Dutch traders had made Benton the center of their trade.
- In 1606, the first shipment of tea was shipped from China to Benton, from where it was distributed to a Europe that was not particularly interested in tea.
- The Indian tea business began in 1823 with the discovery of indigenous tea in Assam.
- It is noteworthy to add here that one of the most well-known teas is grown and produced in northeastern India; this tea is called Darjeeling tea, and the Indian government has registered it as a geographical indicator.
- It has long been maintained that the East India Company's ships routinely transported tea plants into the nation in the early 1700s out of curiosity. In 1780, renowned botanist Col. Kyd, a Calcutta native, noticed tea plants growing in his yard. In the Bengali districts of Coochbehar and Rangpur, native tea plants were noted to be growing wild in 1788 by Sir Joseph Bank, who also recommended tea production. The discovery of indigenous tea in India happened at the same time as the wild teas of Coochbehar. Banerjee and Karmakar (2005).
- Tea is native to eastern and northern India, where it has been grown and sipped for thousands of years, according to literature.
- The British East India Company started producing tea on a considerable scale in Assam

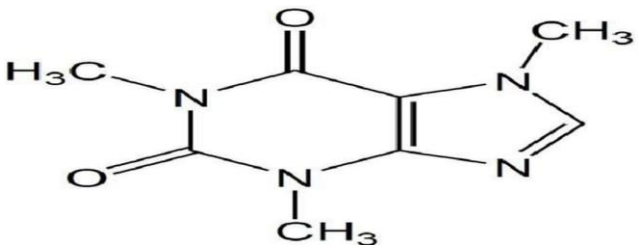
from the beginning of the 1820s. The first English tea garden was founded in 1837 at Chabua in Upper Assam. The Assam Tea Company started producing tea commercially in the area in 1840, and from then on, the tea industry quickly spread to other regions of the nation.

- India is one of the world's top producers of tea nowadays, with the country consuming around 70% of the crop. Assam emerged as the world's top tea-producing region by the turn of the century. But its cultivation was limited to particular regions of the nation because of particular soil and climate conditions. (Arya, 2013).[10]

Caffeine

It is thought that the most commonly utilized psychoactive drug is caffeine.[11] Across 63 plant species worldwide, caffeine is a naturally occurring alkaloid belonging to the methylxanthine family that is present in the leaves, seeds, and fruits of those plants. It is a white powder that has a strong, bitter taste when pure. Its scientific name is 1, 3, and 5-trimethylxanthine, and its molecular formula is C8H10N4O2 (Aurnaud, 1987). given is its structural formula. It is frequently added to beverages intended to aid with weight loss, improve athletic performance, and contain pharmaceuticals.[12]

Caffeine's chemical structure.[13]



Caffeine

(1) Source of caffeine: Tea, coffee, beverages, and chocolates are just a few of the foods that contain caffeine.[14]

(2) The amount of caffeine in tea: 24 to 50 mg/150 ml.[15]

(3) Caffeine dosage: The average daily intake of caffeine for all consumers (regardless of age) is 1.73 mg/kg body weight, or about 120 mg per day. Compared to adults, children eat far less caffeine. Little children aged 1–5 and 6–9 years old consumed an average of 14 and 22 mg of caffeine per day, or 0.82 and 0.85 mg/kg body weight per day, from all caffeinated liquids as of 2004. Teas and soft drinks are the main sources of caffeine for teens and young adults.[16] There are no known negative effects from daily caffeine use up to 400 mg day1 (or 6 mg kg1 body weight day1 in a 65 kg person). When caffeine is used during

specific times, a daily amount of 5300 mg may have a negative impact on some reproductive and developmental factors.[17]

(4) Caffeine Function: Caffeine functions After absorption, caffeine enters the brain fast. It does not accumulate in the blood or the body's reserves. Urine is where it goes from the body many hours after consumption. Caffeine is not necessary for nutrition. In the diet, it can be omitted. It is said that caffeine excites and stimulates the brain and neurological system.[18]

PHARMACOKINETICS

Absorption and Distribution

After consumption, caffeine enters the bloodstream from the digestive system almost entirely and quickly. The blood's maximum caffeine concentrations are attained one to one and a half hours after consumption. All across the body, caffeine is easily absorbed. It crosses the blood-brain barrier, enters the fetus and amniotic fluid through the placenta, and exits into breast milk. Semen has also been found to contain caffeine.[19,20]

Metabolism

The principal location of caffeine metabolism is the liver. Adults metabolize caffeine almost entirely from the paraxanthine intermediate to 1-methylxanthine and 1-methyluric acid. Merely 1% to 5% of caffeine consumed is retrieved undigested in the urine. Approximately 85% of caffeine provided to infants is excreted in urine unaltered until they reach the age of 8 or 9 months, due to their significantly lower ability to metabolize the stimulant.[20,21,22]

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Excretion

Caffeine's half-life of elimination varies from 3 to 7 hours and is affected by a number of circumstances, such as age, sex, usage of oral contraceptives, pregnancy, and smoking. It has been stated that women have a 20– 30% shorter half-life of caffeine than men. Newborns have half-lives of 50 to 100 hours, but by the time they are 6 months old, their half-lives progressively resemble those of adults. For females taking oral contraceptive steroids, the half-life is roughly twice that of ovulatory females. The metabolic half-life increases gradually over the course of pregnancy, rising from 4 hours in the first trimester to 18 hours in the third. There is a roughly two-fold increase in the rate of caffeine elimination linked to cigarette smoking.[23]

Table no. 2: Summarize Caffeine's Pharmacokinetic.[24]

LogP	0.85
Absorption rate	~0.33 minute-1
constant (K01)	
Volumeofdistribution	0.5–0.75 L/kg
Plasma-protein binding	~10– 30%
Half-life (t1/2)	~4 hour
Clearance	~ 1–3 mg/kg/min
Elimination rate constant	~0.09–0.33 hour-1

PHARMACODYNAMIC

Caffeine's primary mode of action involves antagonistic interactions with adenosine receptors. The locally produced purine adenosine acts on differentiation receptors to either raise or lower the amounts of cyclic adenosine monophosphate (cAMP) in cells. Adenosine receptors are specifically blocked by caffeine, which also competitively reduces adenosines function. Caffeine's primary mode of action involves antagonistic interactions with adenosine receptors. The locally produced purine adenosine acts on differentiation receptors to either raise or lower the amounts of cyclic adenosine monophosphate (cAMP) in cells. Adenosine receptors are specifically blocked by caffeine, which also competitively reduces adenosines function.[25]

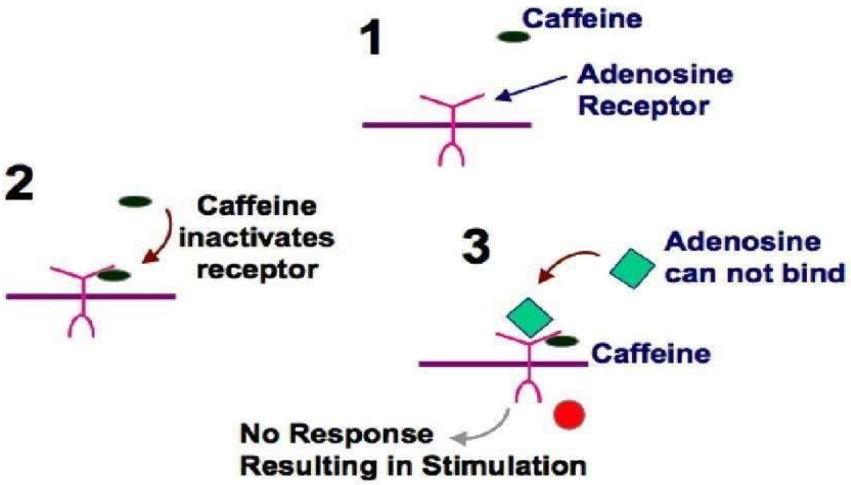

Fig. 2: Mechanism of action of caffeine.[26]

HEALTH BENEFIT OF CAFFEINE CONSUMPTION

1. Caffeine On Mood And Behavior

Caffeine selectively blocks adenosine receptors and competitively decreases adenosine's activity when consumed in excess of 10–50 µM in the extracellular medium.[27] Caffeine thus increases the release of different neurotransmitters, including norepinephrine, dopamine, and serotonin[29], and responds to dopaminergic receptors.[28] It also stimulates psychomotor properties and

enhances behavioral functions, including mood and wellbeing[30], sense of energy[31], and effects on alertness, mental focus, and attention.[32, 33]

2. Caffeine And Exercise Performance

Caffeine exerts a positive effect on endurance and exercise capacity owing to the aforementioned neural mechanisms that trigger a chain of physiological reactions, which makes it an ergogenic resource.[34] Exercise performance is shown to be significantly improved by oral caffeine administration or by the consumption of dietary sources. either by avoiding fatigue, improving substrates supply or by enhancing oxygen uptake.[35,36]

3. Caffeine And Antioxidants And Antiflammatory

Some of the beneficial health effects reported for caffeine have been associated with antioxidant properties.[37-38] Caffeine anti-inflammatory potential has also been linked to modifications in cell signaling molecules production.[39] In many studies, caffeine potentiated the release of anti-inflammatory cytokines, including interleukin10 (IL-10).[40,41]

4. A Decreased Chance of Diabetes

Higher coffeine intakes were linked to a significant decrease in the risk of diabetes in both groups. On the other hand, in neither research did tea drinking impact the risk of type 2 diabetes.

5. Recuperation from damage to the liver

Drinking more than two cups of coffee or tea a day lowers the chance of getting chronic liver disease by more than half compared to people who only take one cup.[42]

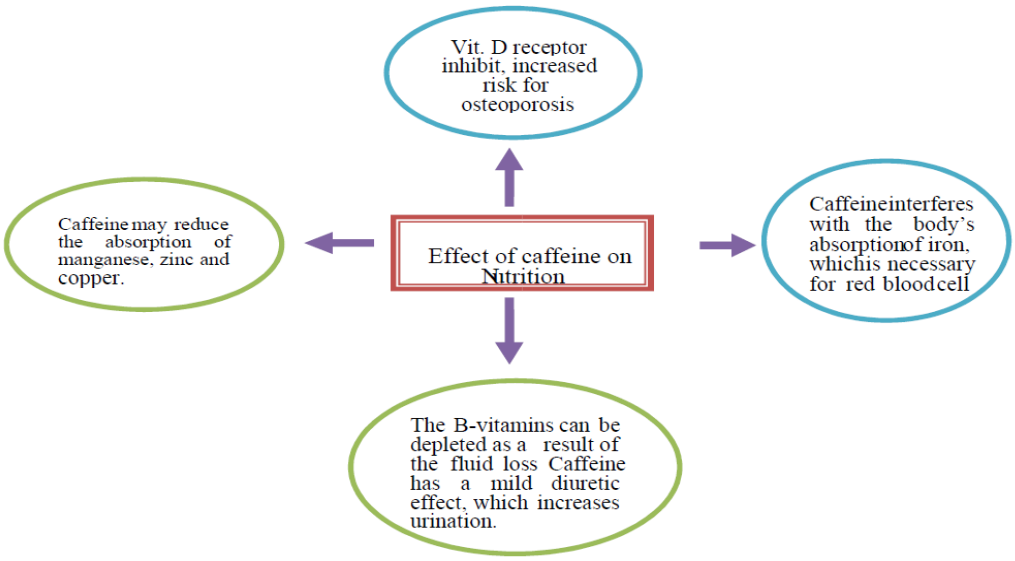

Fig. 3: Caffeine Effect on Neutriation.[42]

CONCLUSION

Tea is the widely consumed non-alcoholic beverage in the world with essential eco-nomic and health benefits, since its leaves contain polyphenols, catechins, caffeine, theanine, saponin, and volatile oils. As clearly discussed in the above review, there is evident that caffeine consumption at varying levels may help reduce the risk of several chronic diseases. Caffeine can cause nutrient deficiencies at high dose that c a n affect both health and quality of life. As with most dietary factors, moderation and balance are keys in optimal nutrition intake. affect both health and quality of life. As with most dietary factors, moderation and balance are keys in optimal nutrition intake.

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