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EXTRACTION OF CAFFEINE FROM DIFFERENT TEA AND EFFECT OF ITS CONSUMPTION ON HUMAN HEALTH

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ABSTRACT: The present study reflects the minor approach which involved the extraction as well as characterization of caffeine available in variety of tea leaves which are consumed in two different states of India (Telengana& Uttar Pradesh). As people of both the states are very fond of drinking tea. Extraction process involved variety of steps which are discussed in the study. As well as the effect of consumption of caffeine or the permissible intake of caffeine through tea has also been discussed throughout the study and compared the data with the literature data. The utmost significant methylated alkaloid that happens obviously is Caffeine.

Key words: - Caffeine, Tea leaves, health effects, isolation

INTRODUCTION:

Tea is considered to be the most common drink in India, irrespective of any part of the country. It is the most widely important part of the daily routine. Caffeine is the major ingredient which exists in various food materials like, coffee, chocolates, soft drinks etc. Additional foundations of caffeine comprises, yerba mate, guarana berries, kola nuts, yaupan holly and cocoa beans. Actually it is originate certainly in plants sources or fruitlets of numerous herbal classes. Caffeine's reputation as a regular stimulating is incomparable. [1]. Although chocolate as well as extra cocoa-having diets donate slight quantities of caffeine to the food, the popular of the caffeine expended originates from hot drink [2-3]. Caffeineis one of the dynamic element that creates coffee plus tea valued to human being. It is an alkaloid, a group of obviously stirring complexes covering nitrogen then taking the belongings of biological amine base. Caffeine is found in over 60 plant species. It fit in to a class of certainly stirring composites identified as xanthines. The xanthines, come from vegetation, are probably the eldest well-known exciting ingredient. Caffeine is the utmost influential xanthine in its capability to rise attentiveness, hold over sleep also to surge ones ability for intelligent. It is a vasodilator which relaxes the blood basins) along with a diuretic (increases urination). Tea which we usually pick up is prepared after the shrubberies of an Asian ever popular acknowledged as Camellia sinensis. Black tea, red tea, green tea as well as white tea wholly originated since this herb, in addition to entirely have caffeine. The occurrence of caffeine in plant life benefits to avoid them after pests plus extra herbivores with the combination's unpleasant flavor also inspiring abilities. The rising outgrowths in addition to new plants of tea flowers building the maximum extents of caffeine. [4]. If we drink chocolate or cola, coffee, tea, and cocoa we are developing a tendency in our body a triumph of caffeine. Nicotine as well as alcohol, accompanied by caffeine are the three utmost broadly recycled attitude-disturbing medicines around the globe. The special effects of caffeine on human be determined by absorptions. Intense extraordinary dose of this complex reasons several psychosomatic and biological effects which contain stimulus of the vital anxious arrangement, diuresis and gastric acid secretion

[5-6]. Caffeine consumption is growing globally. The essential inspirations are generally absorption as well as remembrance improvement also physical act development. Several researches proposed that, consumption caffeine frequently although in adequate volumes; can result in prolonged migraines and headaches [7].

Chemical structure and Properties of Caffeine

Caffeine is a trimethylxanthine in which the three methyl groups are placed
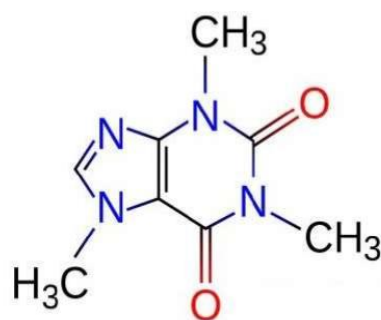
At positions 1, 3, also 7. A purine alkaloid that take place certainly in coffee as well as tea. Caffeine is well-defined as an alkaloid, which is a group of nitrogenous biological complexes of herbal source that have marked physiological actions on humans. Numerous of these nitrogen created organic complexes are identified for devouring a vicious afterward flavor added to alkaloids consist of cocaine, morphine, poisons and nicotine.

A number of things of caffeine are; pure anhydrous caffeine flavor vicious, whitish in color and odorless powder with melting point 235—237oC. Caffeine is soberly solvable in water at ambient temperature (2g/100ml), however actual solvable in boiling water (66g/100ml) with a chemical formula $C_8H_{10}N_4O_2$ and biochemical arrangement as shown in Figure 1. It is somewhat solvable in Benzene and petroleum ether but then soberly soluble in acetone as well as alcohols solvents. Pure caffeine sublimes at 178oC and is feebly basic with a pH range of 6.5 to 10.4

needing strong acid to protonate it [8-9]. Caffeine is equally fat plus water-solvable, which permits it to clearance over closely every tissues simply. Similarly, caffeine might be assisted through the barricade via conferring to a carrier that is frequently linked with adenosine, a particle produced in all human chambers [10].

MATERIALS AND METHODS :

Liquid-liquid extraction method has been used for caffeine from each tea sample as reported by many authors [11-12]. Tea samples collected from Uttar Pradesh town Shikohabad and Telengana's capital Hyderabad local market are - Tata tea, Waghbakri, TajMahal tea, Red label tea, Hyderabad local tea, Assam tea. Each sample of tea kept in dry clean separate beakers for further treatment. For clear identification mark all six beakers by A [Tata], B[Wagh], C[Taj], D[Red], E[Hyd], F[Assam]. Tea samples, lead acetate, chloroform, beakers, glass rod, filter paper, funnel, water. First of all, 50g of tea sample were taken and 150ml of water was added to it in a beaker. Then the beaker was heated up to extreme boiling. The solution was filtered and lead acetate was added to the filtrate, leading to the formation of curdy brown colored precipitate. We kept on adding lead acetate till no more precipitate has been formed. Again solution was filtered. Now the filtrate was heated until it had become 50ml. Then the solution was allowed to cool up to 15-20oC. After that, 20 ml of chloroform was added. Soon after, two layers appeared in the separating funnel. We separated the lower layer. The solution then exposed to atmosphere in order to allow chloroform to get evaporated. The residue left behind was caffeine. The weight of caffeine powder was considered as the final weight. On subtracting the initial weight from the final weight, the amount of caffeine extracted was found. Then we weighed it and recorded the observations. Similar procedure was

performed with different samples of tea leaves and quantity of caffeine was observed in them.

RESULT AND DISCUSSION :

The fine quality powdered has been extracted from the different tea samples. The extraction procedure used for determining the amount of caffeine has been proved to be highly efficient. The amount of caffeine present in different tea samples has been showed in Table 1. Percentage of caffeine from six different tea samples has been determined by the given formula-

$$\frac{\text{Weight of caffeine recovered (gm)} \times 100}{\text{Weight of tea sample (gm)}}$$

The caffeine content found maximum in TajMahal tea (1.9 %) and minimum has been reported in Assam tea (1.2%) sample. The Tata tea sample is also showing second highest amount of caffeine present in the available sample. It has been recommended that the alteration of caffeine contented in tea leaves through the pile-fermentation be determined by not simply on the development as well as reproduction of microorganisms, however on the tea conformation [13]. The results proposed that the TajMahal tea and Tata tea sample leaves showed a slight exciting consequence related to other variations of tea samples.

The quantity of caffeine too differs dependent on the change of tea, product of tea as well as unswervingly ascribed to the treating then leaf ripeness [14]. The special effects of environs for example limited weather (sunlight/humidity) agricultural as well as soil features may be a smaller amount significant than general deviation in the controller of caffeine substances in both coffee beans plus tea leaves [9]. Amount of caffeine has been reported in Table 2 from literature.

Caffeine is hastily as well as broadly absorbed in the liver cubicles to form dimethyl plus monomethylxanthines, dimethyl also uracil derivatives and monomethyluric acids [16]. Caffeine consumption fluctuates through diverse forms of drinks then in diverse populace clusters [2,17-18]. The utmost renowned severe properties of caffeine ingestion are motivation of brain purpose also development in attitude, as well as bodily presentation [19]. Though, beside the previous ages, numerous epidemiological researches have related modest coffee drinking by means of lessening in the relative possibility of growth of prolonged deteriorating ailments and decease [20-23], besides that caffeine is one of the complexes accountable for several other welfares. They comprise decrease in the possibility of Alzheimer's and Parkinson's illnesses along with hepatoprotective symptoms. The devices include anti-inflammatory and antioxidant actions, amongst other. Caffeine employs an optimistic result on resolution in addition of workout ability owed to the above-mentioned neural contrivances that activate a sequence of biological responses, which marks it an ergogenic reserve [24]. Caffeine also rises harmonization [25] plus decreases the opinion of fatigue and pain [26]. Caffeine consumption has also been related with the incidence of arrhythmias in persons. It yields a straight stimulus of myocardial nerve, foremost to enlarged heart rate as well as force of reduction [16]. Numerous researches approve caffeine's capability to augment attitude and attentiveness [27-28], workout routine [29], the speediness by which info is administered, consciousness, kindness, and response period [30]. Moreover, study has recommended that caffeine can support in dropping signs allied with Parkinson's disease (PD) for example the weakening of distant and minor motor services, and trembles [31-32]. Since PD is a neurodegenerative illness which marks in advanced damage of dopaminergic neurons of the substantianigra, caffeine a nonselective adenosine antagonist is supposed to relief in refining the enactment of the dopaminergic scheme by obstructive the AA2

receptors, therefore, motivating dopamine discharge [32].

CONCLUSION:

Caffeine has been the topic of widespread investigation for its extensive past of usage plus prominent drinking global together in natural diets in addition to drugs. The mutual psychological as well as physiological effects of caffeine consumption be determined by mostly on the specific genotype and on the arrangement plus the mark of acquaintance to the ingredient. The consumption of caffeine as an ergogenic encouragement must not be constrained through disclosure to hot atmospheres owing to worries of amplified liquid damage and amounts of heat storing. Caffeine is an operative approach to stand both cognitive as well as physical deprivation accompanying with sleep deficiency. It could be established that caffeine is a prospective regular, antimicrobial mediator in contradiction of different microorganisms, and so, could be recycled in nutrients as a natural protective, to regulate their development. This study shows various amount of caffeine present in different tea leaves available and used by the people of two different states of India.

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Table 1. Quantity of caffeine recovered from different tea samples from extraction process.

S. No.	Tea Samples	Amount of Caffeine Extracted (gms)	Percentage of caffeine (%)
1.	Assam tea	0.60	1.20
2.	Hyderabad local tea	0.65	1.30
3.	Red label tea	0.70	1.40
4.	Waghbakri	0.85	1.70
5.	Tata tea	0.92	1.84
6.	TajMahal	0.95	1.90

Table 2- Reported amount of caffeine in different tea and food samples.

Tea Samples / Food Samples	Caffeine Level (%)
Soft Drink	0.02 [11, 15]
Chocolate	0.074 [11, 15]
Green tea	3.11 [11,15]
Black tea	3.57 [11, 15]
Earl grey tea	4.27 [11, 15]
Mambila beverage tea	0.040 [1]
Chinese green tea	0.023 [1]
White tea	88 [4]
Red tea	60 [4]

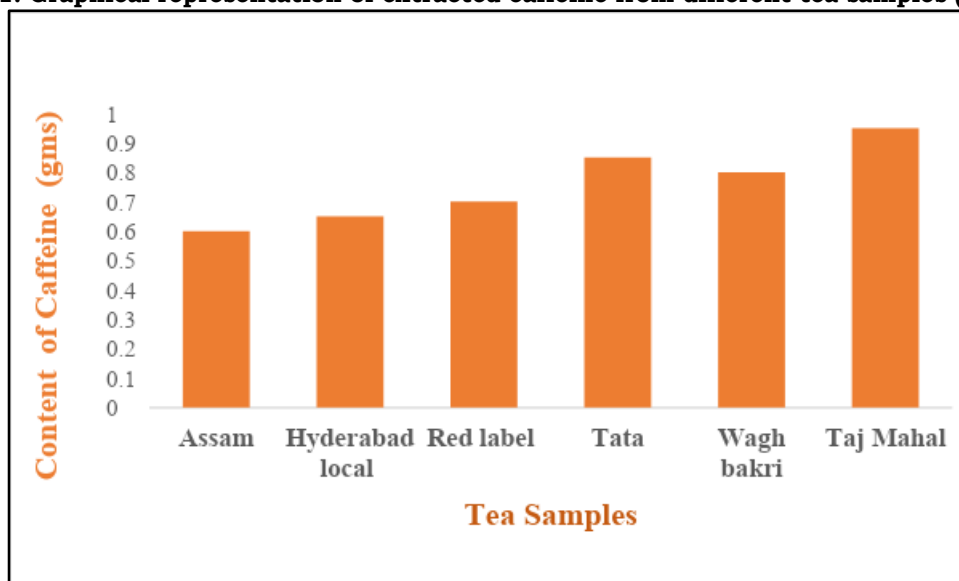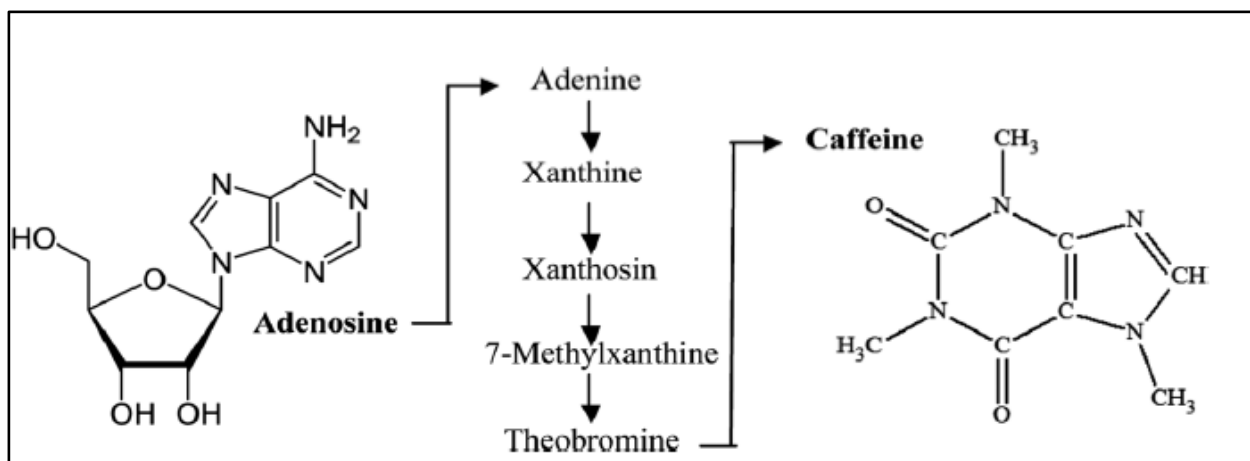**Fig 1. Graphical representation of extracted caffeine from different tea samples (gms).**

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Fig 2. Sample of two layers.

Fig. 3. Biosynthesis of Caffeine from tea.

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