Determination of Caffeine Content in Branded Tea Samples from Gadchiroli Area.

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Abstract:

In present work, we have studied the quantity of caffeine present in various branded tea samples in market nearby Gadchiroli. It is a type of honors of Indian people to welcome our guest with a cup of tea. Somepeople use to drink tea for refreshment and some to get stimulated to do work. Caffeine has some useful effect and also some toxic effect if consumed over the limit. Therefore it is necessary to find out the amount of caffeine present in various tea samples which are generally used by common people in Gadchiroli area. In this study, fifteen different branded tea samples are usedand the weight of caffeine present in all the samples are calculated.

Keywords : Branded tea samples, Caffeine,Effects of caffeine, Gadchiroli area.

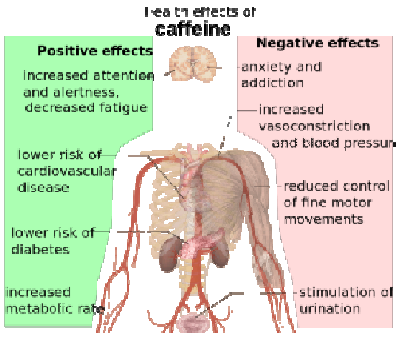
Introduction:

History says that Indian people are using tea from back to 750 BC. Accordingto a very interesting legend, the history of tea drinking in India began with a saintly Buddhist monk about almost 2000 years ago. In the 16th century, the people of India prepared a vegetable dish using tea leaves along with garlic and oil and the boiled leaves were used to prepare a drink as well. This engraving of 1850 after Thomas Brown shows the processing of tea from seed to final drying. The first Tea Garden was established by the British East India Company by the end of the 19th century after the company took over tea cultivation in Assam, a region in the north eastern part of India.

Tea is the most commonly and widely used soft beverage in the household. It acts as a stimulant for central nervous system and skeletal muscles.[1]That's why tea removes fatigue, tiredness and headache.[2]It also increases the capacity of thinking. As per the history of tea drinking in India, local people used to brew and drink tea using the leaves of the wild native tea plants. Since that time, different varieties of tea have emerged, the most famous among them is the Darjeeling tea.

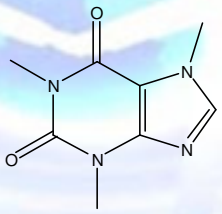
Tea contains catechins, a type of antioxidant.[3,4]Tea also contains the amino acid L-theanine which modulates caffeine's psychoactive effect and contributes to tea's umami taste. Caffeine constitutes about 3% of tea's dry weight, depending upon type, brand[5] and brewing method[6]. Tea also contains small amounts of theobromine and theophylline, which are stimulants and xanthines similar to caffeine.[7] Because of modern environmental pollution, fluoride and aluminium also sometimes occur in tea, certain types of brick tea made from old leaves and stems having the highest levels.[8,9]Although tea contains various polyphenols and tannins, it does not contain tannic acid.[10] The principal constituent of tea, which

is responsible for all these properties, is the alkaloid-caffeine. The figure shows some positive effect and negative effect of caffeine on human health.



Caffeine structure-

The molecular formula of caffeine is $C_8H_{10}N_4O_2$ and its IUPAC name is 1,3,7 – Trimethyl- 1H-purine- 2,6 (3H,7H)-dione. Global consumption of caffeine has been estimated at 120000 tonnes per year, making it the world's most popular psychoactive substance. This amounts to one serving of a caffeinated beverage for every person every day[11]. The FDA says that Caffeine is both a drug and food additive[12]. Caffeine is used in both prescription and over the counter medicines to treat tiredness or drowsiness and to improve the effect of some pain relievers. Caffeine improves physical and mental ability, it acts as a psycho-stimulant,[13,14] Thus, in medicine it is used to stimulate central nervous system. On the contrary the excessive in take of caffeine is harmful to digestion and its long use leads to mental retardation, makes the heart beats faster.



Material and methods:

Collection of samples:

Fifteen tea samples of different famous brands or companies are collected from the market of Gadchiroli area. The present analysis is done in the month of December 2014.

Methodology :

Sample preparation and Caffeine isolation with chloroform.

In 500 mlround bottom flask 50 g of tea and 150 ml of distilled water wasrefluxed for 30 min, and filtered under vacuum. Theresidue was again refluxed and filtered. Obtainedfiltrates were combined, 25 ml of $Pb(CH_3COO)_2$solution was added, boiled (5 min), we get the curdy brown precipitateand filteredthrough a Buchner funnel with silica gel layer. Thefiltrate was extracted four times with chloroform(50 ml). Combined chloroform phases were washedwith KOH solution and then with distilled water.Chloroform was removed from extracts by rotaryevaporator. After evaporation, extracted

caffeinewas weighed and expressed in gm. That weight of residue will give the weight of caffeine present in 50 gram sample[15].

Result and Discussion:

In present study, total fifteen tea samples of various brands are analyzed and the quantity of caffeine is determined. The weight of caffeine contents was found in the ranges0.54 g (WaghBakri Tea brand S_{15}) to 0.74 g (Swastik Tea Brand S_8) per 50 g tea sample

According to the US-based Waverly Health Center, about 250 mg of caffeine per day is considered an average or moderate amount of caffeine[16]. Whereas Health Canada suggest that daily caffeine intake for adults 'No more than 0.40 g or 2.5 mg/Kg body weight [17]. Most experts feel that using small amounts upto 200 mg per day of caffeine during pregnancy is safe[18], but larger amounts of caffeine can be harmful during pregnancy. Consumption of large amounts of caffeine-usually more than 250 mg per day –can lead to a condition known as caffeinism. Caffeinism usually combines caffeine dependency with a wide range of unpleasant physical and mental conditions including nervousness, irritability, restlessness, insomnia, headaches and heart palpitations after caffeine use. [19]

Sr. No.	Sample Code	Name of Tea sample	Quantity of caffeine in (g)	% weight of Caffeine
1	S_1	Halmira Tea	0.68	1.36
2	S_2	Lajawab Tea	0.69	1.38
3	S_3	Maharaja Tea	0.61	1.22
4	S_4	Marvel Gold Tea	0.64	1.28
5	S_5	Rana Tea	0.73	1.46
6	S_6	Red Label Tea	0.55	1.10
7	S_7	Swad Gold Tea	0.70	1.40
8	S_8	Swastik Tea	0.74	1.48
9	S_9	Taaza Tea	0.60	1.20
10	S_{10}	TajMahal Tea	0.58	1.16
11	S_{11}	Tata Tea (Agni)	0.66	1.32
12	S_{12}	Tata Tea (Gold)	0.62	1.24
13	S_{13}	Tata Tea (Premium)	0.56	1.12
14	S_{14}	Waaha Gold Tea	0.71	1.42
15	S_{15}	WaghBakri Tea	0.54	1.08

Weight of each tea sample = 50g

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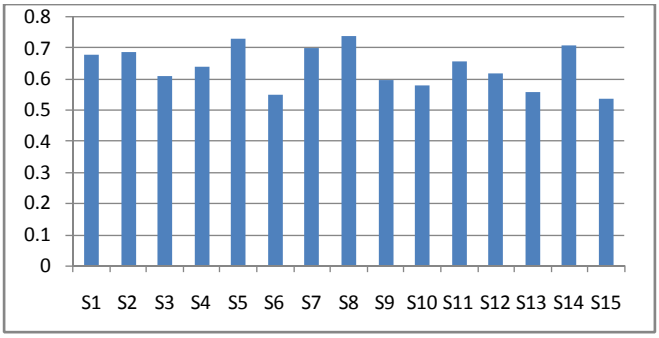

Figure. 1- Estimated amount of caffeine present in tea samples

Conclusion:

From the result, we concluded that the normal people (men,women and pregnant women) used to take maximum 5 cup of tea per day,which contains normally 150mg caffeine that is less than the limit which causes the caffeinism. Hence, no one above tea sample is responsible for caffeinism.

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