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Research Article

EXTRACTION OF CAFFEINE FROM DIFFERENT VARITIES OF TEA SAMPLES

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Abstract

Caffeine a neurostimulant consumed every day. Caffeine is a xanthine alkaloid compound that acts as a stimulant in humans. Caffeine is called with different names : guaranine when found in guarana, mateine when found in mate, and theine when found in tea. The organic solvent dichloromethane is used to extract caffeine from an aqueous extract of tea powder. Different tea powders and tea waste have been utilised in order to extract caffeine .Maximum concentration of caffeine is obtained in lipton tea powder .and total amount of caffeine obtained is 2.20gms/per 100g of tea powder. The caffeine is used as growth stimulant for plants. It was observed that the rapid growth of the plants in soil containing extracted caffeine when compared to plants with tea waste. So caffeine may be used as manure for rapid growth of the plants

Keywords: Neurostimulant, caffeine, tea, dichloromethane.

Introduction

Caffeine is widely used in pharmaceuticals, food and in many other products. Tea contains more caffeine than coffee by dry weight. This may vary in caffeine content based on nature of tea leaves, growing conditions and processing techniques. Today, caffeine is used much as stimulant drug[1]. It provides a "boost of energy" or a feeling of heightened alertness. Many workers can drink tea or coffee frequently in order to get briskness. Likewise, drivers on long road trips often fill their cup holders with energy drinks or convenience-store coffees to help them push through to their destinations[2]. Overall, caffeine is present in the beans, leaves, and fruit of over 60 plants, where it acts as a natural pesticide that paralyzes and kills certain insects feeding upon them. Caffeine is a stimulant of CNS, having the effect of temporarily warding off drowsiness and restoring alertness[3.]

Caffeine is used in broncho pulmonary dysplasia of premature infants for treatment. It may stimulate the weight gain during therapy and reduce the incidence of cerebral palsy as well as reduce language and cognitive delay.

Tea contains more caffeine than coffee by dry weight. A typical serving, however, contains much less, since tea is normally brewed more weakly than coffee. Also contributing to caffeine content are growing conditions, processing techniques, and other variables. Caffeine is also a common ingredient of soft drinks, such as cola, originally prepared from kola nuts. The caffeine in these drinks originates from the ingredients used or is an additive derived from the product of decaffeination or from chemical synthesis. Guarana, a major ingredient of energy drinks which, contains large amounts of caffeine with small amounts of theobromine and theophylline in a naturally occurring slow-release excipient

Chocolate derived from cocoa beans contains a small amount of caffeine. The weak stimulant effect of chocolate may be due to a combination of theobromine and theophylline, as well as caffeine. A typical 28-gram serving of a dark chocolate has two times the amount caffeine as coffee[4]: Tablets offer the advantages over coffee and tea of convenience, known dosage, and avoiding concomitant fluid intake. The caffeine binding tablets improves mental alertness. These tablets are commonly used by students for their exams and by people who work or drive for long hours [5].

Some beverages combine alcohol with natural sources of amla and caffeine to create a caffeinated alcoholic drink(brown)[6]. The stimulant effects of caffeine may hidden the depressant effects of alcohol, potentially reducing the user's awareness of their level of intoxication[7]. The main objective of this study to extract the caffeine from different varieties of tea samples and its biological properties were analyzed.

Materials and Methods

Different varieties of Indian tea samples were purchased from the market. Tea waste was collected from tea stall. The physical properties of tea powder and tea waste were analyzed.

Tea acidity and taste

Twenty-five grams of each sample was taken in a beaker and 100 ml of water was poured to it. The solution was heated till it boiled, after which the beaker was kept covered and allowed to stand for 5 minutes. A drop was taken from each beaker to spot on a pH meter. After recording the pH of the different tea samples we also tasted a sample of the tea from each beaker[8].

Analysis of color

The 20grams of the sample was taken in a beaker added 200 ml of distilled water to it. The colour intensity was measured using a spectrophotometer at 450 nm.

Analysis of bulk density

A weighed quantity of tea powder was introduced into a graduated measuring cylinder. The measuring cylinder was tapped manually till a constant volume was obtained. This volume is known as the bulk volume of the tea powder. The same procedure was followed for each brand of tea powder. Bulk density of powder is defined as the ratio of the mass of the powder to its bulk volume of distilled water.

Bulk density = mass of the powder / bulk volume)[10].

Extraction of caffeine

Tea bags are used as the source of caffeine for this experiment. Different varieties of 5 tea bags(20 g of each) were taken and boiled with 200 ml of distilled water for 10 minutes. This was allowed to cool for 5 minutes and then decant the mixture into another beaker. Then the tea bags were squeezed to liberate the rest of thewater. The collected aqueous solution was cooled and mixed with 30ml of dichloromethane followed by 1%sodium sulphide. This mixture was mixed and poured into separation funnel. Two layers were separated and extracted filtrate was further heated to get the white crystals of caffeine. The extracted caffeine was measured spectrophotometerically at 645nm. The physical properties of caffeine were analyzed[11].

Antioxidant assay.

Antioxidant capacity of tea extracts and caffeine solutions (100 mg/l) were determined using the ABTS radical scavenging assay according to the method reported by Re *etal*. (1999)[11], and ferric reducing/antioxidant power (FRAP) assay, carried out according to the original method by Benzie and Strain (1996)[12].

Results and Discussion

The different varieties of tea samples and tea waste were subjected in to analysis of pH and bulk density. Most Tea has the slightly acidic pH and they possess a mildly bitter taste (Table1). Red Label Tea had the pH of 5.5, with a strong bitter taste[13].

Tetley tea was found to be low pH and mild bitter in taste. The colour of the different tea samples were observed in range

of light brown to dark brown. The bulk density of Red label and Lipton tea were fall in the range of 0.42g to 0.43g. Green tea of Tetley had the lowest absorbance of 0.29 but Red label showed highest absorbance of 0.53. There is a linear relationship between color and bitter taste.

Table 1: Physical characteristics of tea powders and tea waste.

Sample	pH	Bulk densty	Taste	Colour
3ROSES	4.7	0.33g±0.01	Bitter	Brown
TETLEY	4.0	0.23g ±0.001	Mild bitter	Light brown
LIPTON	4.8	0.42g±0.02	Bitter	Brown
TEA WASTE	4.3	0.32g±0.003	Mild Bitter	Brown
RED LABEL	5.5	0.43g±0.014	Strong bitter	Dark brown

Table.2: Caffeine contents of tea samples.

Sample	Absorbance	Caffeine
3ROSES	1.83	32.6mg/g
TETLY	1.61	42.5mg/g
LIPTON	1.74	40.3mg/g
TEA WASTE	0.34	11.5mg/g
RED LABEL	1.70	40.7mg/g

The caffeine content was extracted from tea samples and its concentration was observed by using spectrophotometer. Ashihara and Kubota (1986) reported that caffeine production is most active in young tea leaves and buds, which should contain the highest caffeine content[1]. The maximum concentration of caffeine was found in Tetley and less in 3Roses. The tea waste also contained less amount of caffeine. Earlier studies reported that caffeine content is associated to origin, genetic and environmental variability, harvest time and processing manner of plant material[3].

According to the obtained results, all studied teas exhibited high antioxidant activity ,reflecting that the contribution of caffeine to the antioxidant roperties.The maximum amount of caffeine crystals was extracted from 3roses tea powder to be 2.20gms.Lipton and tetly tea powders had 1.25and 1.5 gm of caffeine per 250kgof sample.

Conclusion

The caffeine was extracted from tea powder and tea waste samples. Caffine is a good neuro stimulant and also inhibit the growth of cancer cells. Thus caffeine play an important role in cancer research for my future research.

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