

## A REVIEW ON CAFFEINE AND IT'S EFFECT IN HUMAN BODY

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### ABSTRACT

Caffeine is a methylxanthine alkaloid with purine structure, it acts on the central nervous system (CNS). It is chemically related to adenine and guanine basis of DNA and RNA respectively. Caffeine containing drinks such as tea, coffee and cola are consumed globally in high volumes. Caffeine has both positive and negative health effects. It may have a small preventive effect against certain disorders including Parkinsons diseases. Some people experience sleep disruption or anxiety when they consume caffeine, also it can cause a moderate forms of drug dependence. This article focuses on the effect of caffeine in human body.

### KEY WORDS

Caffeine, tea powder, health issues

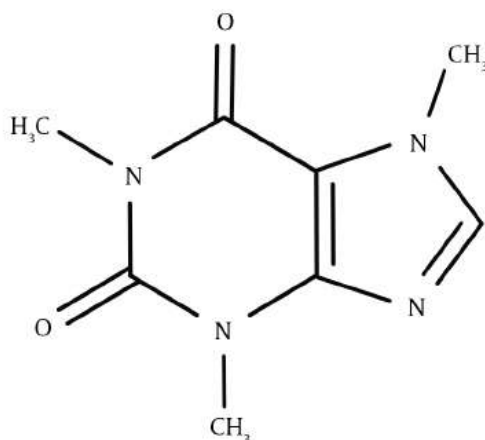
### INTRODUCTION

The most popular and extensively utilized soft drinks in homies is tea regarded as the most commonly used psychoactive drug. Tea with a modest caffeine content seem to enhance cognitive function. According to FDA, caffeine is a food as well as a drug. Over consumption of caffeine may cause many health problems.

### CHEMICAL STRUCTURE AND CHARACTERISTICS OF CAFFEINE

#### CHEMICAL STRUCTURE

Caffeine (C<sub>8</sub>H<sub>10</sub>N<sub>4</sub>O<sub>2</sub>) also known as 1,3,7 trimethylxanthine, is a methylxanthine alkaloid. Many plants and trees produce it, along with its precursor theobromine, to defend themselves from illness and predators. In terms of structure, these substances are carbon and nitrogen-based molecules composed of two purine rings, a pyrimidine ring (C<sub>5</sub> ring) and a imidazole ring (C<sub>6</sub> ring), both of which two nitrogen atoms.

CAFFEINE (1- ethyl-3, 7-dimethyl-3,7-dihydro-1*H*- purine-2,6- dione)

## CHARACTERISTICS

Caffeine is odourless and has a distinct bitter taste . It is a white powder with a density of 1.23 that is mildly soluble in organic solvents and water. However, its solubility in water increases significantly at higher temperature (1% w/w) at 15 and 10% at 60. The melting point is 234-239, and the sublimation temperature at atmospheric pressure is 178 .Caffeine is a very weak base that reacts with acids to form easily hydrolyzed salts and is relatively stable in dilute acids and alkalis. Caffeine reacts with acids to generate unstable salts which are destroyed by strong caustic alkali solutions. Caffeine has a UV absorption spectrum that peaks at 274nm and has an absorption coefficient of 9700 in aqueous solution.

## EFFECTS OF CAFFEINE IN HUMAN BODY

### MECHANISM OF ACTION

Caffeine mode of action is complicated because it affects multiple body systems. A plausible mechanism involves the inhibition of adenosine receptors, nucleotide phosphodiesterase enzymes, calcium handling inside cells and also involved in adenosine receptor antagonism. Through their effects on the second messengers cAMP and cGMP, phosphodiesterase enzymes control cell activity. By activating hormone sensitive lipases, this results in lipolysis and the release of glycerol and fatty acids.

## USES OF CAFFEINE

Caffeine is a stimulant it makes your nervous system and brain function more actively. Additionally, it promotes body's circulation of hormones like adrenaline and cortisol. Caffeine can help you feel focused and energized in low quantities. Low moderate doses (50-300 mg) may promote alertness, energy and concentration. However, the studies related to caffeine seems to indicate that it has certain health benefits.

Caffeine produces various benefits on illness such as, auto immune diseases, immunomodulation and ocular, respiratory, neurodegenerative diseases.

- **Anti-inflammatory disease**

In most cases, inflammation is triggered by an injection or tissue injury. Caffeine has the ability to modulate the immunological system.

- **Ocular diseases**

Along with choroid and choroidal cells, retinal endothelium and retinal pigment endothelial cells (RPE) also express adenosine receptors. Caffeine may therefore potentially be effective in treating eye conditions such as retinal inflammation and choroida neovascularization.

- **Respiratory diseases**

Caffeine is now used as a clinical treatment for respiratory illness, specifically premature new born ailments like apnea and bronchopulmonary dysplasia (BPD).

- **Neurodegenerative diseases**

Among psychoactive stimulants, caffeine is thought to be the most commonly ingested stimulant worldwide. This naturally occurring substance can penetrate the blood brain barrier and based on published research, may stimulate the central nervous system by influencing a number of molecular targets including adenosine receptor antagonism, intracellular calcium mobilization, phosphodiesterase inhibition and GABA receptor inhibition.

## SIDE EFFECTS

Many people start every day with caffeine in one form or another to help them feel more alert, energised and focused.

That's not a bad thing for many people, if your overall health is good and you don't have any other health condition, the most common signs you are having too

much caffeine include,

- Anxiety, restlessness,
- Having trouble sleeping,
- Experiencing stomach problem or heartburn,
- Dizziness or shakiness
- Rapid heart beat

Caffeine is both a natural product and a drug. It is a mixed bag of good and not so good. If it's working for you, there is no reason to make a change.

## **TOXICITY**

The oral LD50 for caffeine in rats is 192mg/kg. MSDS an acute lethal overdose of caffeine in human is approximately 10-14 gm (equal to 150 -200mg/kg of body weight).

## **CAFFEINE OVERDOSE**

Caffeine overdose can cause seizures because it stimulates the CNS. It should be taken with considerable caution in people with epilepsy or other seizure disorders. Overdose symptoms may include nausea, vomiting, diarrhea and gastrointestinal Disturbance. The world health organization's international classification of disease (ICD-10) includes caffeine intoxication depending on the amount of caffeine ingested. Symptoms may include agitation, anxiety, restlessness, sleeplessness, tachycardia, tremors, psychomotor agitation and in extreme circumstances death. Overdose is more frequent in people who do not consume caffeine on a regular basis but do consume energy drinks.

## **CONCENTRATION OF CAFFEINE**

Your metabolism overall health and body mass all affect how you respond to caffeine .It also depends on how much caffeine you consume in a single serving and weather your body is acclimated to receiving regular dosages, studies indicate that a daily intake of 400 mg or less of caffeine is suitable for most people.

## **CONCLUSION**

This article aims to describe about the chemical structure and nature of caffeine. How this chemical substance enters human body due to daily consumption of various beverages. As we know caffeine if consumed in excess will cause many health issues, on the other side it also has medicinal value and is used as preventive medicine for many

diseases. Thus, the article includes positive and negative effects of caffeine in human body.

## REFERENCES

1. Vuletic N, Bardic L, Odzak R. Spectrophotometric determining of caffeine content in the selection of teas, soft and energy drinks available on the Croatian market. *Food Res.* 2021 Apr 11;5(2):325-30.
2. Nawrot P, Jordan S, Eastwood J, Rotstein J, Hugenholtz A, Feeley M. Effects of caffeine on human health. *Food Additives and Contaminants.* 2003 Jan;20(1):1-30.
3. Saraiva SM, Jacinto TA, Gonçalves AC, Gaspar D, Silva LR. Overview of Caffeine Effects on Human Health and Emerging Delivery Strategies. *Pharmaceuticals.* 2023 Jul 27;16(8):1067.
4. Distelberg BJ, Staack A, Elsen KD, Sabaté J. The Effect of Coffee and Caffeine on Mood, Sleep, and Health-Related Quality of Life. *Journal of Caffeine Research.* 2017 Jun;7(2):59-70.
5. Ahmad Bhawani S, Fong SS, Mohamad Ibrahim MN. Spectrophotometric Analysis of Caffeine. *International Journal of Analytical Chemistry.* 2015; 2015:1-7.
6. Belay A, Ture K, Redi M, Asfaw A. Measurement of caffeine in coffee beans with UV/vis spectrometer. *Food Chemistry.* 2008 May;108(1):310-5.
7. Gazal U. A Comparative Analysis of Caffeine Extraction Efficiency from Different Tea Varieties and Its Effect on Human Physiology: A Spectrophotometric Investigation. *AJAC.* 2023;14(03):134-48.
8. Yu X, Sun D, He Y. Emerging techniques for determining the quality and safety of tea products: A review. *Comp Rev Food Sci Food Safe.* 2020 Sep;19(5):2613-38.
9. Ghosh AK, Ghosh C, Gupta A. A Simple Approach to Detect Caffeine in Tea Beverages. *J Agric Food Chem.* 2013 Apr 24;61(16):3814-20.
10. Shao J, Zhang Y. Determination of caffeine content in tea beverages. *IOP Conf Ser: Earth Environ Sci.* 2019 Oct 1;330(4):042056.