

Caffeine – An Enigma

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Considering the growing public health significance of some forms of caffeine use, such as the consumption of energy drinks with high caffeine content that are currently largely unregulated or combinations of caffeine and methamphetamine, the International Classification of Diseases 11 (ICD 11) separates caffeine from other stimulants.^[1] A stimulant and diuretic, caffeine is a bitter alkaloid that is mostly found in coffee, tea, cacao, and kola nuts.^[2] As a stimulant of the Central Nervous System(CNS) it boosts the body's flow of hormone like cortisol.^[3] Caffeine promotes relative brain hypoperfusion by increasing energy metabolism while simultaneously diminishing cerebral blood flow. Caffeine stimulates noradrenaline neurons, and appears to affect release of dopamine locally.^[4] Caffeine is quickly and nearly entirely (up to 99%) absorbed into the bloodstream after consumption.^[5]


In adults, routine caffeine consumption up to 400 mg per day and 3 mg/kg by weight per day for children and adolescents does not raise safety concerns, according to research by the European Food Safety Authority (EFSA). The recommended daily dosage of caffeine for expectant women is 200 mg.^[6] According to some authorities, individuals who are particularly vulnerable to the negative effects of caffeine include children, adolescents, and pregnant women. Caffeine consumption in low or moderate amount is generally safe, but higher doses consumed by vulnerable individuals can cause cardiovascular problems and perinatal complications.^[7]

Some of the positive effects of caffeine that have been documented in the literature includes increased alertness, pain relief, inverse association between caffeine consumption and the risk of Parkinson's disease and protection against Diabetes Mellitus.

Acute ingestion of caffeine results in some increase in blood pressure and change in heart rate (bradycardia or tachycardia) that are dose-dependent. Cardiac arrhythmias are also a side effect. Caffeine toxicity has been observed. Several hospitalizations and some deaths due to caffeine intoxication have been reported.^[8] Abstinence from caffeine may cause withdrawal symptoms, including headaches, fatigue, irritability, depressed mood, difficulty concentrating, and flu-like symptoms.^[9]

The intake of caffeine which was by way of regular beverages in many households in the form of tea and coffee, is now available in many other substances. Besides tea and coffee, different products that contain caffeine are energy drinks, chocolate and energy bars, cookies, cola beverages, chewing gum, ice cream, pain pills, caffeine pills, skin care products and some weight loss products. Caffeine is commonly used by athletes for its performance-enhancing or ergogenic effects.^[10]

Chocolates, one of the most favourite food items of children and adolescents. Most chocolates contain caffeine, except the white milk chocolates which does not have cocoa solids and thus no or minimal caffeine. From a very young age, children ingest caffeine without them or their parents realizing that they are ingesting caffeine.

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The darker the chocolate, the higher the caffeine content, which depends on quantity of cocoa solids. The type and origin of the cocoa beans determine the caffeine content. Cocoa contains a good percentage of methylxanthine compounds, caffeine and theobromine are the predominant ones. Both contain naturally occurring substances that can stimulate the central nervous system.^[11]

The caffeine content varies depending on the product. The effects of caffeine also vary based on age, gender, individual response to caffeine and other factors. The stimulating effects of caffeine make it an ideal candidate for students preparing for exams. This CNS stimulant is used by college students in various forms, be it coffee, tea, energy drinks, caffeine pills, coffee candy, chocolate and many more. However, during this stressful period, they may consume higher doses of caffeine and experience side effects. Students find the caffeinated products readily available and effective. They should be made aware of the side effects of higher doses of these substances.

There is rising concern about the increasing consumption of caffeinated foods such as coffee, energy drinks, tea and chocolate products, particularly among adolescents. Some researchers have found that over consumption of caffeine in adolescents is associated with a range of adverse health effects, which includes irritability, nervousness, nausea, cardiovascular symptoms, trouble sleeping, osteoporosis, and stomach ulcers.^[12]

It is feasible to calculate the amount of caffeine consumed from the products labelling caffeine content. Caffeine consumption calculation excludes caffeine sources that are not explicitly labelled as caffeine compounds. The public health concern is that there is a largely unregulated and rapidly growing market for caffeine-based products and people are unaware of the caffeine contents of foods and the effects of excess consumption of this stimulant.

The soft drinks, chocolates (all varieties), energy drinks which were earlier available in urban markets have now reached to rural markets. These pocket friendly products attract all age groups, especially

adolescents who are ready to experiment with new things. The food products, with high caffeine content can be harmful. Some of the advertisements also have strong impact on adolescents to try caffeine containing energy boosting drinks. During periods of stress the young may reach for these products leading to habituation in the long run.

There is an urgent need to study the impact of caffeine on health. The caffeine disorders were included as a separate code under ICD 11 because they have potential for dependence and intoxication. Some important categories from ICD 11 on caffeine consumption are listed in Annexure 1.^[13]

Young people are already at risk of using substances, especially tobacco and alcohol. There is an urgent need to prevent addiction to other substances. When alcohol is mixed with caffeine (especially in energy drinks), the caffeine can conceal the depressant effects of alcohol. Drinkers feel more alert than usual. As a result, they may consume more alcohol and be more impaired than they realize, increasing the risk of alcohol-related harm.^[14]

There is generally an additive effect on subjective and cardiovascular responses when nicotine and caffeine are combined.^[15] We need to focus on research and intervention to reduce caffeine, alcohol and tobacco (CAT) use among adolescents. Products containing caffeine must mention content on the food package label. Some products display the harmful effects and the restriction of consumption for certain groups.

The consumer will be more aware of the warning if it is displayed on the front of the package. The font size should be large enough for everyone to read easily. The energy drinks come with a warning about the effects on children and pregnant women. But, is there a policy that says they are not for sale to children? A law has been passed by Hungary to tax food and drink components with a high risk for health, such as sugar, salt and caffeine.^[16] Similar and more stringent regulation should be implemented in our country to minimise the adverse effects of various substances having side effects.

Annexure I: ICD 11 Caffeine use disorder categories^[13]

Code: 6C48.2

Caffeine intoxication is a clinically significant transient condition that develops during or shortly after the consumption of caffeine that is characterised by disturbances in consciousness, cognition, perception, affect, behaviour, or coordination. These disturbances are caused by the known pharmacological effects of caffeine and their intensity is closely related to the amount of caffeine consumed. They are time-limited and abate as caffeine is cleared from the body. Presenting features may include restlessness, anxiety, excitement, insomnia, flushed face, tachycardia, diuresis, gastrointestinal disturbances, muscle twitching, psychomotor agitation, perspiration or chills, and nausea or vomiting. Cardiac arrhythmias may occur. Disturbances typical of intoxication tend to occur at relatively higher doses (e.g., > 1 g per day). Very high doses of caffeine (e.g., > 5 g) can result in respiratory distress or seizures and can be fatal

Code: 6C48.3

Caffeine withdrawal has been mentioned as “Caffeine withdrawal is a clinically significant cluster of symptoms, behaviours and/or physiological features, varying in degree of severity and duration, that occurs upon cessation or reduction of use of caffeine (typically in the form of coffee, caffeinated drinks, or as an ingredient in certain over-the-counter medications) in individuals who have used caffeine for a prolonged period or in large amounts. Presenting features of Caffeine withdrawal may include headache, marked fatigue or drowsiness, irritability, depressed or dysphoric mood, nausea or vomiting, and difficulty concentrating.”

CODE 6C48.40

Caffeine-induced anxiety disorder is characterised by anxiety symptoms (e.g., apprehension or worry, fear, physiological symptoms of excessive autonomic arousal, avoidance behaviour) that develop during or soon after intoxication with or withdrawal from caffeine. The intensity or duration of the symptoms is substantially in excess of anxiety symptoms that are characteristic of Caffeine intoxication or Caffeine withdrawal. The amount and duration of caffeine use must be capable of producing anxiety symptoms. The symptoms are not better explained by a primary mental disorder (e.g., an Anxiety and fear-related disorder, a Depressive disorder with prominent anxiety symptoms), as might be the case if the anxiety symptoms preceded the onset of the caffeine use, if the symptoms persist for a substantial period of time after cessation of the caffeine use or withdrawal, or if there is other evidence of a pre-existing primary mental disorder with anxiety symptoms (e.g., a history of prior episodes not associated with caffeine use).

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