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Review Article
DECAF COFFEE- The need of the Hour

J. Sumitha

Department of Microbiology, JBAS College for Women, Teynampet, Chennai-60 018, Tamil Nadu, India
Corresponding Author : *jsumetha@gmail.com*

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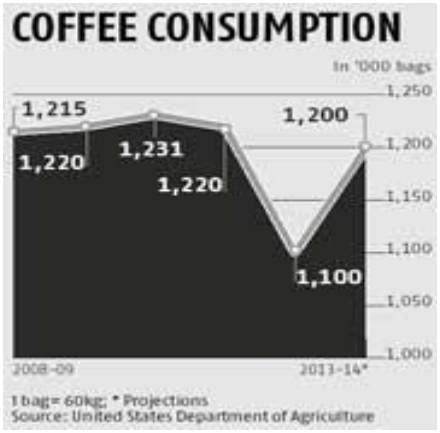
Abstract

Caffeine is the most widely consumed psychoactive or central nervous system stimulant in the world. In addition to its natural occurrence in some foods, caffeine is used as a food additive and as a drug or a component of many pharmaceutical preparations. When administered in the amounts commonly found in foods, beverages, and drugs, it has measurable effects on certain types of human performance. As a food additive, caffeine is generally considered safe based on a long history of use and on extensive research conducted over more than a century throughout the world. However, despite this long history of use, modern epidemiological techniques have raised concerns about associations between continued use of high levels of caffeine and long-term health. Amounts of caffeine in commonly used beverages and other products vary a great deal from as low as 2 mg/8 oz of chocolate milk, to as much as 300 mg/6 oz of strong espresso coffee.

Introduction

Coffee – The first thing we think in the morning and the last thing we think about its ill effects. Caffeine (1,3,7-trimethylxanthine) and the related methylxanthines theobromine (3,7-dimethylxanthine) and theophylline (1,3-dimethylxanthine)are alkaloid compounds widely distributed in plants throughout the world. More than 60 different plant species containing caffeine have been identified. The primary sources of these compounds are coffee *(Caffea arabica),* kola nuts *(Cola acuminata),* tea *(Thea sinensis),* and chocolate (*Cocoa* bean).

Caffeine is present in most of the beverages consumed in India viz., Coffee, Tea and Colas. India's coffee consumption is set recover to 1.2 million bags (72,000 tonnes) in 2013-14, a modest rise of nine per cent compared with 1.1 million bags (66,000 tonnes) in 2012-13, according to the United States Department of Agriculture (USDA). Before falling in 2012-13, average annual consumption in India stood at about 1.2 million bags through five consecutive years, USDA said in its latest report 'Coffee: World Markets and Trade' from the report adapted from Coffee Board of India.



Caffeine metabolism

Caffeine is rapidly and completely absorbed in humans, with 99 percent being absorbed within 45 minutes of ingestion. Peak plasma concentrations occur between 15 and 120 minutes after oral ingestion, and may be influenced by route of

administration, the form of administration, or other components of the diet. Once caffeine is absorbed, it is distributed rapidly throughout body water. However, caffeine is also sufficiently lipophilic to pass through all biological membranes and readily crosses the blood-brain barrier. The mean half-life of caffeine in plasma of healthy individuals is about 5 hours, although its half-life may range between 1.5 and 9.5 hours. This wide variation in reported half-life may be due to individual variation in excretion rates, or whether the individual smokes (decreases half-life) or uses oral contraceptives (increases half-life).

The pharmacological effects of caffeine (similar to those of other methylxanthines) include mild stimulation and wakefulness, ability to sustain intellectual activity, and decreased reaction times. The fatal acute oral dose of caffeine in humans is estimated to be between 10 and 14 g (150–200 mg/kg). Ingestion of caffeine in doses up to 10 g has caused convulsions and vomiting, with complete recovery in 6 hours. Side effects have also been observed in humans at caffeine intakes of 1 g (15 mg/kg), progressing from mild effects including restlessness, nervousness, and irritability, to more serious effects such as delirium, emesis, neuromuscular tremors, and convulsions.

Physiology

Physiological effects of caffeine include cardiovascular, respiratory and renal and smooth muscle effects, as well as effects on mood, memory, alertness, and physical and cognitive performance. Caffeine's effect on cognitive function appears to be mediated via several mechanisms: the antagonism of adenosine receptors, the inhibition of phosphodiesterases, the release of calcium from intracellular stores, and antagonism of benzodiazepine receptors. Caffeine's action in blocking adenosine receptors and inhibiting phosphodiesterase appears to be the most important mechanism of action with respect to physiological and behavioral effects. (Originally adapted from Caffeine for the Sustainment of Mental Task Performance : National Academy of Sciences.)

DECAF COFFEE- A Real solution?!

Conventional decaffeination techniques (Dixon and Johnston, 1997) like solvent extraction or use of supercritical carbon dioxide can be expensive, toxic to the environment and non-specific. So there is a strong need for caffeine degradation by alternative routes other than conventional techniques. The potential use of microbes and their enzymes is an attractive alternative as it is cheap, easier and faster (Mazzefera et al.,2002). Harnessing the caffeine degrading potential of organisms growing in caffeine rich soil is of importance in developing processes for biodecaffeination and production of methylxanthine intermediates which have therapeutic value.

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