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1 Clock Hour

Caffeine - Induced Psychiatric Disorders

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Caffeine is a bitter, white crystalline xanthine alkaloid that acts as a psychoactive stimulant drug and a mild diuretic[1]. In humans, caffeine is a central nervous system (CNS) stimulant[2], having the effect of temporarily warding off drowsiness and restoring alertness. Beverages containing caffeine, such as coffee, tea, soft drinks and energy drinks, enjoy great popularity. Caffeine is the world's most widely consumed psychoactive substance, estimated at 120,000 tonnes per annum[3], but unlike many other psychoactive substances, it is legal and unregulated in nearly all jurisdictions. The half-life of caffeine — the time required for the body to eliminate one-half of the total amount of caffeine — varies widely among individuals according to such factors as age, liver function, pregnancy, some concurrent medications, and the level of enzymes in the liver needed for caffeine metabolism. In healthy adults, caffeine's half-life is approximately 3-4 hours. The average daily consumption of caffeine among Americans is 219 mg.[4] Adults receive nearly three quarters of their daily caffeine from coffee. Children receive one half of their caffeine from soft drinks. Energy drinks represent a fast-growing beverage market. A combination of caffeine and herbal ingredients are touted as providing an energy boost. Energy drinks vary in the amount of caffeine included in their formulations and can range from around 50-300 mg. Consumers seeking the activating qualities of caffeine in pill form can find many preparations, the more well known having 200 mg. Individuals worldwide consume about 76 mg of caffeine per day. Most people experience no behavioral effects with less than 300 mg caffeine. Sleep is more sensitive and can be disrupted by 200 mg caffeine. At doses exceeding 1 g per day, susceptible individuals experience toxic effects. The caffeine content in some common sources of caffeine is listed below (Table1).

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Caffeine Addiction

Although caffeine does not produce with life-threatening health risks commonly associated with the use of classic drugs of addiction such as cocaine, heroin and nicotine, some caffeine users report becoming "addicted" to caffeine in the sense that they report an inability to quit or to cut down their caffeine use. The mood altering effects of caffeine depend on the amount of caffeine consumed and whether the individual is physically dependent on or tolerant to caffeine. In caffeine non-users or intermittent users, low dietary doses of caffeine (20-200 mg) generally produce positive mood effects such as increased well-being, happiness, energetic arousal, alertness, and sociability. Among daily caffeine consumers, much of the positive mood effect experienced with consumption of caffeine in the morning after overnight abstinence is due to suppression of low grade withdrawal symptoms such as sleepiness and lethargy. Large caffeine doses (200 mg or greater) may produce negative mood effects. Although generally mild and brief, these effects include increased anxiety, nervousness, jitteriness, and upset stomach. However, individual differences in sensitivity and tolerance affect the severity and likelihood of experiencing negative effects.

It is clear that caffeine is a drug reinforcer, meaning the ability to sustain regular self-administration (i.e., drug-taking). People continue to use caffeine despite having medical or psychological problems made worse by caffeine in order to avoid experiencing caffeine withdrawal symptoms. Withdrawal symptoms — possibly including headache, irritability, an inability to concentrate, drowsiness, insomnia and pain in the stomach, upper body, and joints[5]— may appear within 12 to 24 hours after discontinuation of caffeine intake, peak at roughly 48 hours, and usually last from one to five days, representing the time required for the number of adenosine receptors in the brain to revert to "normal" levels, uninfluenced by caffeine consumption. In United States, the prevalence rates for caffeine-induced psychiatric disorders have not been well established. Mood disorders and other substance abuses coexist with caffeine disorders. Some studies report 50% comorbidity.[6,7] There are four caffeine-induced psychiatric disorders recognized by the DSM-IV, the diagnosis manual of the American Psychiatric Association: caffeine intoxication, caffeine-induced anxiety disorder, caffeine-induced sleep disorder, and caffeine-related disorder not otherwise specified.[8] (Table 2–6).

Table 1. Caffeine Content of Foods and Drugs

Product	Serving Size 1	Caffeine (mg)2
OTC Drugs		
NoDoz, maximum strength; Vivarin	1 tablet	200
Excedrin	2 tablets	130
NoDoz, regular strength	1 tablet	100
Anacin	2 tablets	64
Coffees		
Coffee, brewed	8 ounces	135
General Foods International Coffee, Orange Cappuccino	8 ounces	102
Coffee, instant	8 ounces	95
General Foods International Coffee, Cafe Vienna	8 ounces	90
Maxwell House Cappuccino, Mocha	8 ounces	60-65
General Foods International Coffee, Swiss Mocha	8 ounces	55
Maxwell House Cappuccino, French Vanilla or Irish Cream	8 ounces	45-50
Maxwell House Cappuccino, Amaretto	8 ounces	25-30
General Foods International Coffee, Viennese Chocolate Cafe	8 ounces	26
Maxwell House Cappuccino, decaffeinated	8 ounces	3-6
Coffee, decaffeinated	8 ounces	5
Teas		
Celestial Seasonings Iced Lemon Ginseng Tea	16-ounce bottle	100
Bigelow Raspberry Royale Tea	8 ounces	83
Tea, leaf or bag	8 ounces	50
Snapple Iced Tea, all varieties	16-ounce bottle	48
Lipton Natural Brew Iced Tea Mix, unsweetened	8 ounces	25-45
Lipton Tea	8 ounces	35-40
Lipton Iced Tea, assorted varieties	16-ounce bottle	18-40
Lipton Natural Brew Iced Tea Mix, sweetened	8 ounces	15-35
Nestea Pure Sweetened Iced Tea	16-ounce bottle	34
Tea, green	8 ounces	30
Arizona Iced Tea, assorted varieties	16-ounce bottle	15-30
Lipton Soothing Moments Blackberry	Tea 8 ounces	25
Nestea Pure Lemon Sweetened Iced Tea	16-ounce bottle	22
Tea, instant	8 ounces	15
Lipton Natural Brew Iced Tea Mix, diet	8 ounces	10-15
Lipton Natural Brew Iced Tea Mix, decaffeinated	8 ounces	< 5
Celestial Seasonings Herbal Tea, all varieties	8 ounces	0
Celestial Seasonings Herbal Iced Tea, bottled	16-ounce bottle	0
Lipton Soothing Moments Peppermint Tea	8 ounces	0
Soft Drinks		
Josta	12 ounces	58
Mountain Dew	12 ounces	55
Soft Drinks (cont'd.)		
Surge	12 ounces	51
Diet Coke	12 ounces	47
Coca-Cola	12 ounces	45
Dr. Pepper, regular or diet	12 ounces	41
Sunkist Orange Soda	12 ounces	40
Pepsi-Cola	12 ounces	37
Barqs Root Beer	12 ounces	23
7-UP or Diet 7-UP	12 ounces	0
Barqs Diet Root Beer	12 ounces	0
Caffeine-free Coca-Cola or Diet Coke	12 ounces	0
Caffeine-free Pepsi or Diet Pepsi	12 ounces	0
Minute Maid Orange Soda	12 ounces	0
Mug Root Beer	12 ounces	0
Sprite or Diet Sprite	12 ounces	0
Caffeinated Waters		
Java Water	½ liter (16.9 ounces)	125
Krank 20	½ liter (16.9 ounces)	100
Aqua Blast	½ liter (16.9 ounces)	90
Water Joe	½ liter (16.9 ounces)	60-70
Aqua Java	½ liter (16.9 ounces)	50-60
Juices		
Juiced	10 ounces	60
Frozen Desserts		
Ben & Jerry's No Fat Coffee Fudge Frozen Yogurt	1 cup	85
Starbucks Coffee Ice Cream, assorted flavors	1 cup	40-60
Häagen-Dazs Coffee Ice Cream	1 cup	58
Häagen-Dazs Coffee Frozen Yogurt, fat-free	1 cup	40
Häagen-Dazs Coffee Fudge Ice Cream, low-fat	1 cup	30
Starbucks Frappuccino Bar	1 bar (2.5 ounces)	15
Healthy Choice Cappuccino Chocolate Chunk or Cappuccino Mocha Fudge Ice Cream	1 cup	8
Yogurts, one container		
Dannon Coffee Yogurt	8 ounces	45
Yoplait Cafe Au Lait Yogurt	6 ounces	5
Dannon Light Cappuccino Yogurt	8 ounces	< 1
Stonyfield Farm Cappuccino Yogurt	8 ounces	0
Chocolates or Candies		
Hershey's Special Dark Chocolate Bar	1 bar (1.5 ounces)	31
Perugina Milk Chocolate Bar with Cappuccino Filling	1/3 bar (1.2 ounces)	24
Hershey Bar (milk chocolate)	1 bar (1.5 ounces)	10
Coffee Nips (hard candy)	2 pieces	6

Adopted from the Nutrition Action Center for Science in the Public Interest[14]

** Serving sizes are based on commonly eaten portions, pharmaceutical instructions, or the amount of the leading-selling container size. For example, beverages sold in 16-ounce or half-liter bottles were counted as one serving*

A recently-released report from University of Massachusetts Medical School noted 4,600 caffeine-related calls to the American Association of Poison Control Centers in 2005, the most recent data available. More than half involved people under 19, and 2,345 required treatment in a health care facility.[9]

Caffeine intoxication

Caffeine intoxication is currently defined by a number of symptoms and clinical features that emerge in response to recent consumption of caffeine. The potential for caffeine intoxication to cause clinically significant distress is reflected by the inclusion of caffeine intoxication as a diagnosis in DSM-IV (*Diagnostic and Statistical Manual of Mental Disorders,* Fourth Edition) (see Table 2). Although DSM-IV diagnostic guidelines indicate that diagnosis is dependent on the recent daily consumption of at least 250 mg of caffeine, the equivalent of just two and a half cups of brewed coffee, intoxication is most often observed at much higher doses of caffeine (i.e., > 500 mg). However, individual sensitivity and tolerance are likely to influence the dose effects. A person with high sensitivity and little tolerance might show signs and symptoms of caffeine intoxication in response to doses of caffeine much lower than a regular user. Treatment of severe caffeine intoxication is generally supportive, providing treatment of the immediate symptoms, but if the patient has very high serum levels of caffeine, then peritoneal dialysis, hemodialysis, or hemofiltration may be required. In severe cases, death may result from convulsions or an irregular heartbeat due to ventricular fibrillation brought about by effects of caffeine on the cardiovascular system.

Caffeine-induced anxiety disorder

In some individuals, the large amounts of caffeine can induce anxiety severe enough to necessitate clinical attention. Studies have shown that high dietary doses of caffeine (200 mg or more) increase anxiety ratings and induce panic attacks in the general population. Individuals with panic and anxiety disorders are especially sensitive to the effects of caffeine. Although highly anxious individuals tend to be more likely to limit their caffeine use, not all individuals with anxiety problems naturally avoid caffeine, and some may fail to recognize the role that caffeine is playing in their anxiety symptoms. This caffeine-induced anxiety disorder can take many forms, from generalized anxiety to panic attacks, obsessive-compulsive symptoms, or even phobic symptoms (see Table 3). Because this condition can mimic organic mental disorders such as panic disorder, generalized anxiety disorder, bipolar disorder, or even schizophrenia,[10] a number of medical professionals believe caffeine-intoxicated people are routinely misdiagnosed and unnecessarily medicated when the treatment for caffeine-induced psychosis would simply be to stop further caffeine intake.

Caffeine-induced sleep disorder

Caffeine-induced sleep disorder is a psychiatric disorder that results from overconsumption of the stimulant caffeine, see Table 4. Caffeine's effects on sleep appear to be determined by a variety of factors including dose, the time between caffeine ingestion and attempted sleep, and individual differences in sensitivity and/or tolerance to caffeine. The effects of caffeine on sleep are dose-dependent with higher doses showing greater disruption on a number of sleep quality measures. Caffeine administered immediately prior to bedtime or throughout the day has been shown to delay sleep onset, reduce total sleep time, alter the normal stages of sleep, and decrease the reported quality of sleep. Caffeine-induced sleep disturbance is greatest among individuals who are not regular caffeine users. Although there is evidence for some tolerance to the sleep disrupting effects of caffeine, complete tolerance may not occur and thus, habitual caffeine consumers are still vulnerable to caffeine-induced sleep problems.[11]

Moderation Is the Key

Caffeine is usually thought to be safe in moderate amounts. Experts consider 200-300 mg of caffeine a day to be a moderate amount for adults. But consuming as little as 100 mg of caffeine a day can lead a person to become "dependent" on caffeine. This means that someone may develop withdrawal symptoms (like tiredness, irritability, and headaches) if he or she quits caffeine suddenly.[12] Energy drinks are increasingly popular and caffeine is a main ingredient contributing to the sense of arousal. Children and adolescents can consume large amounts of caffeine in pursuit of a "buzz." Even unwitting overconsumption can produce the signs of caffeine intoxication. Parents should encourage children to carefully read the labels and avoid consuming excess amounts of caffeine.[13] Only petroleum exceeds coffee as a globally traded commodity, and commerce and history of the United States are closely linked to tea consumption. Soft drinks now rank as the most popular beverage in the United States, and most contain caffeine. Beverage trade groups estimate the annual per capita soft drink consumption at 56 gallons. Research and worldwide beverage history confirm the safety of moderate caffeine consumption in healthy individuals. Caffeine is the only addictive psychoactive substance that has overcome resistance and disapproval around the world to the extent that it is freely available almost everywhere, unregulated, sold without license, offered over the counter in tablet and capsule form, and even added to beverages intended for children.

Table 2. DSM-IV criteria for caffeine intoxication

Recent consumption of caffeine, usually in excess of 250 mg (more than 2-3 cups of brewed coffee)

- Demonstration of 5 or more of the following signs during or shortly after caffeine use:
  - Restlessness
  - Nervousness
  - Excitement
  - Insomnia
  - Flushed face
  - Diuresis
  - Gastrointestinal disturbance
  - Muscle twitching
  - Rambling flow of thought and speech
  - Tachycardia or cardiac arrhythmia
  - Periods of inexhaustibility
  - Psychomotor agitation
- The above symptoms cause clinically significant distress or impairment in social, occupational, or other important areas of functioning.
- The symptoms are not due to a general medical condition and are not better accounted for by another mental disorder, such as an anxiety disorder.

Table 3. DSM-IV criteria for caffeine-induced anxiety disorder

- Prominent anxiety predominates in the clinical picture.
- There is evidence from the history, physical examination, or laboratory findings suggesting that the anxiety developed within 1 month of caffeine intoxication or withdrawal or that medications containing caffeine are etiologically related to the disturbance.
- The disturbance is not better accounted for by an anxiety disorder that is not substance-induced.
- The disturbance does not occur exclusively during the course of a delirium.
- The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.

Table 4. DSM-IV criteria for caffeine-induced sleep disorder

- A prominent disturbance in sleep occurs that is sufficiently severe to warrant independent clinical attention.
- There is evidence from the history, physical examination, or laboratory findings that the sleep disturbance is the direct physiological consequence of caffeine consumption.
- The disturbance is not better accounted for by another mental disorder.
- The disturbance does not occur exclusively during the course of a delirium.
- The disturbance does not meet the criteria for breathing-related sleep disorder or narcolepsy.
- The sleep disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.

Table 5. DSM-IV criteria for caffeine-related disorder NOS

- This includes any caffeine disorder other than those previously listed.
- Symptoms of caffeine withdrawal that are not currently an officially recognized diagnosis are present.

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