Is Caffeine a Public Health Issue?

Jody L Vogelzang, PhD, RDN, FAND, CHES
Caffeine is a naturally occurring substance found in plants. It increases the activity of the central nervous system by inhibiting the binding of adenosine by antagonizing the receptors. This biological process can affect heart rate, sleep, cognition, and memory. The plasma half-life of caffeine, or the period of time required for the concentration of caffeine in the body to be reduced by one-half, is five to six hours, and initial effects are felt within about 30 minutes of ingestion. Not all adults lose sleep after an evening cup of coffee, but research suggests that caffeine does have a dose-dependent negative effect on sleep onset, sleep time, and sleep quality.

In the past, literature has focused primarily on the role of caffeine and health in adults. More recently, literature is emerging on how it affects children and adolescents. Caffeine consumption is ubiquitous with greater than 50% of the adult U.S. population consuming coffee on a regular basis. For those with a routine that involves coffee, about three cups per day appears to be an average consumption providing around 350 mg/day of caffeine. However in children and teens, caffeine is found in other preferred beverages such as carbonated soft drinks and energy drinks, and now even peanut butter! Although deaths in the United States related directly to caffeine overdose is small, hospitals are reporting a surge in caffeine overdoses presenting in the emergency department. From January 1 to July 31, 2015, poison centers logged 1,675 reports involving highly caffeinated energy drinks. Almost two-thirds of these incidents involved children 18 years or younger. The availability of caffeine in liquid and solid forms makes caffeine-related risks a public health concern. Perhaps the most dramatic caffeine overdose is illustrated by the death of a high-school senior, Logan Stiner, who died after use of caffeine powder which has 4,706 mg of caffeine in one teaspoon. Caffeine powder is unregulated, available online, and is
marketed to athletes.

Often quoted as a “safe amount,” 400 mg/day appears to be benign. To put that into context at a coffee shop, the average Starbucks’ Grande Caffè Americano, or large American coffee, has 225 mg of caffeine. Not a problem for the average adult. However, the availability of caffeine in foods and drink is not regulated, so if an adolescent decided to consume the same amount of a concentrated energy supplement (16 oz.), the caffeine could soar as high as 1600 mg, an amount that may impact health, academic performance, and emotional state. High amounts of caffeine (measured as mg/kg body weight) can also affect sleep rhythms, further affecting academic and social activities.

Luebbe and Bell noted that adolescents appear more vulnerable to an increase in depressive symptoms with increasing caffeine consumption. Carskadon and Tarokh noted that caffeine consumption contributed in part to sleep patterns. Caffeine coupled with smart phone and computer use in the evening added to delayed and short sleep patterns. This, in turn, contributed to more caffeine use as a countermeasure to sleep deprivation. The findings of a study completed by Walker, Abraham, and Tercyak found that ADHD was related to higher ingestion of caffeine in adolescence. The reason for this is only speculated in their research, but may lay with the enhancement of the ADHD prescription drugs with caffeine ingestion.

Caffeine, a psychoactive substance that upwards of 80% of the world population voluntarily and routinely manipulates for its pharmacological effect, is not regulated. This is a topic for further discussion in public health forums. The inclusion of caffeine intake on nutrition and health assessment forms, label disclosure on caffeine content, and an agreed upon safe level for children and teens (as in Canada) would advance the protection of the public. Looking at underlying reasons for heavy use of caffeine in a younger population is also critical. Registered dietitians nutritionists have an important role to play in addressing the dangers of caffeine, especially in the adolescent population.
References


About the Author

Dr. Jody Vogelzang is a nationally recognized registered dietitian nutritionist and an Academy of Nutrition and Dietetics Medallion recipient. She holds a bachelor’s degree in dietetics from Michigan State University, a Master of Science in Health Science from Grand Valley State University, a Master of Arts in Biology from Miami University, and a PhD in Health Services with a specialization in Community Health from Walden University. She is also a certified health educator and a Fellow of the Academy of Nutrition and Dietetics. Since 2011, Vogelzang has been researching the food environment in Grand Rapids, Michigan. Her funded research has produced primary data on food insecurity, food availability, price and quality in neighborhood stores and supermarkets, and nutrition education in building self-efficacy with elementary age low-income children, and
unaccompanied refugee minors. Her cooking and physical activity program "Kick and Cook-a-Palooza"
has been held in multiple locations in Grand Rapids, and is funded through a Kids Eat Right grant
from the Academy of Nutrition and Dietetics Foundation.