

The Effects of Caffeine on Health: The Benefits Outweigh the Risks

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ABSTRACT

This literature review examines the relationship between caffeine and various health effects. This paper will review the research on health risks related to caffeine consumption and weigh the balance between the risks and benefits that caffeine can provide. Although there are several risks correlated with caffeine consumption, this literature review highlights how the benefits may offset any potential risks. The main benefits that will be discussed are enhancing physical performance, alertness, pain relief, reducing cognitive impairment, hydration, and reducing the risk of cardiovascular and cerebrovascular diseases.

Caffeine is a legal substance that many people indulge in on a daily basis, and it is the most popular drug in the world (Rogers 2012). Caffeinated products are found everywhere and are constantly being advertised. American society relies on coffee shops like Dunkin Donuts and Starbucks to start their morning routine. Through the language they use and how they portray their image, these businesses support a culture in which consumers need coffee in their everyday lives. Dunkin Donuts even uses the slogan “America runs on Dunkins,” indicating that without it, people would not be able to function properly. Likewise, “Starbucks Corporation has associated coffee with the language of love: self-love, romantic love, and philanthropic love” (Ruzich 2008: 428). Thus, Starbucks influences people to want their products not because they love coffee, but because they love Starbucks.

From an early start, people are socialized to consume caffeine. As a child, getting to eat chocolate is a treat. As people get older, soda is a caffeinated product that many enjoy and drink in social settings. Growing into teens and young adults, coffee is something that people start to drink on dates, job meetings, and to catch up with old friends -- and many learn to consume coffee as a normal part of every day. Often, people do not consume caffeinated substances for certain health benefits, rather they like the taste and enjoyment associated with the product.

With caffeine playing an important role in our social world and not having any restrictions to its use, we as consumers should be educated about health risks due to caffeine consumption. My first goal is to examine the proposed health risks of caffeine consumption and whether there is a direct correlation to health problems. My second goal will be to explain how caffeine offers benefits for physical performance, alertness, pain relief, reducing cognitive impairment, hydration, and reducing the risk of cardiovascular and cerebrovascular diseases, while also addressing evidence that caffeine has its risks such as heart disease. It is my intention to address that the health benefits for caffeine consumption outweigh any potential health risks. The main caffeinated products that will be discussed are tea, coffee, cola, cocoa, and chocolate being that they are the most common means for caffeine consumption.

POTENTIAL RISKS

Though caffeine is a substance that is used daily, it is still a drug. Caffeine is a stimulant that has been linked to negative health outcomes such as raised blood pressure and panic attacks (Faupel *et al.* 2013). As with any drug, there are potential risks to its use. However, caffeine is not a severe drug, because it has a very high lethal dose. In order to overdose on caffeine, one must consume 100 cups of coffee in a two to

three hour time span (Faupel *et al.* 2013). It would take a large amount for a very harmful outcome to occur, so are the potential risks really a concern to the majority of the general population?

Kristjansson *et al.* (2013) discuss that caffeine can lead to violent behavior. In the study, the researchers found that when using a sample of adolescents, drinking caffeinated beverages could lead to violent behavior, such as punching or kicking someone, and the relationship was stronger for girls compared to boys. This relationship was stronger for girls compared to boys, therefore these results may be supporting evidence that sex is a moderating variable in the relationship between caffeine consumption and violent behavior. The study only sampled adolescents, so age may also be influencing the relationship. Children are not fully developed yet, so there could be factors such as hormones affecting the correlation. It may be that certain populations, such as children, are at risk when they drink caffeine.

Diego *et al.* (2008) concluded from their study that women are at risk for depression and anxiety symptoms if they consume caffeine during pregnancy. Babies who were born to mothers that consumed caffeine during pregnancy were also shown to have lower birth weights and stress behaviors, included hiccups, tremors, and jerkiness (Diego *et al.* 2008). Those women who were drinking caffeinated beverages also smoked more, were less educated, and got less sleep than those who were not drinking caffeine. These lifestyle factors could be influencing the negative health outcomes more than the caffeine. Caffeine and nicotine are both stimulants and it is not clear which drug is leading to these negative health outcomes. Peck, Leviton, and Cowan (2010) refuted this information stating that they did not find a direct link between caffeine intake and harmful reproductive or perinatal outcomes. Like many other researchers, they agreed that it is hard to measure caffeine consumption and distinguish which products are influencing the effects.

Although the research has shown a correlation between caffeine and health risks, such as violent tendencies from adolescent users and stress behaviors in babies born to caffeine using mothers, it is hard to differentiate between the caffeine itself and the other products in the beverages. There are also other factors to consider for the cause of negative health effects, so controlling for outside factors is important in future research. In order to know what risks are only from caffeine, more research should be conducted on the direct relationship. As a substance consumed on a daily basis, people should be aware of the risks, and a large amount of caffeine consumption should be avoided.

BENEFITS

So many people start their day with a cup of coffee. Whether it is made at home or bought at a coffee shop, coffee is a part of many morning routines. One of the reasons caffeine is so appealing to people in the morning is that it increases alertness (Rogers 2012). Not only is this helpful for people getting up early in the morning, but because of this benefit, caffeine can help people in high stress occupations. This can be helpful for military workers or sleepy drivers, who are persuaded to consume caffeinated beverages to stay alert (Rogers 2012). The military needs to be on point at all times, especially those in combat. They are constantly at risk for an attack, so those who are on guard would want to consume caffeine to fight against mental fatigue. Mental alertness is also important for sleepy drivers. People who must drive long distances, especially at night, drink coffee or other beverages to stay awake and prevent accidents. Although it is important to keep people awake, caffeine is also known to increase anxiety, raise blood pressure, and decrease hand steadiness (Rogers 2012). There are risks that may affect how people perform, but keeping tired drivers awake so they do not cause harm to themselves or others seems to outweigh the short-term risks such as raising anxiety.

Although those in high stress positions benefit from increased alertness, those not in high stress roles also benefit from these properties. Caffeine consumption before school or work can facilitate a more attentive mindset, so the individual is more productive. Many people begin their day with coffee and some jobs even have morning meetings where coffee drinking is a norm that goes along with the social setting.

Some people do not stop with just a morning cup of coffee to start the day; some keep drinking caffeinated beverages throughout the day to stay alert and productive. Ruxton (2012) discusses how caffeine pills have shown to help people with alertness, short-term recall and reaction time, mood, and fatigue. Caffeine has shown to be beneficial to mental health, and researchers also state that there may be a connection between caffeine consumption and helping the mind stay “sharp” as people age (Rogers 2012), although data on whether this is a causal relationship is unclear. More research must be done to see how mental health is affected by caffeine.

Along with mental acuteness, caffeine also helps physical performance by increasing endurance and enhancing muscle contractions (Rogers 2012). Athletes who consume caffeine have an advantage over the non-user in that they can last longer while playing sports. With this advantage, the International Olympic Committee had to ban caffeine use so that those who used caffeine did not have an unfair advantage over those who did not (Ruxton 2012). Ruxton (2012) found that this physical advantage was more prevalent in young people who were already in good shape; however, Ruxton also noted that some healthy older adults benefited physically from the use of caffeine as well. Age may be a moderating factor in this relationship, so more research should be done on physical performance to see what factors are influencing it the most.

In the past, it was thought that the more caffeine one drinks leads to greater fluid excretion, which would cause dehydration. On the contrary, studies have shown that caffeinated products hydrate consumers despite the popular thought that they dehydrate users (Ruxton 2012). Ruxton (2012) suggests the risk for dehydration from caffeine consumption occurs only for those who drink twelve cups of tea or six cups of strongly brewed coffee each day.

Another popular belief about caffeine is that it causes heart disease. There are many studies on this subject, however, according to Goldberg (2012), there is not a direct link between caffeine consumption and heart disease. One reason this is so difficult to determine is that two popular drinks that contain caffeine, tea and coffee, also have polyphenols in them, which are beneficial to one’s heart (Ruxton 2012). This factor makes it hard to differentiate between the effects of caffeine and the effects of polyphenols. Without knowing which product has a positive effect on one’s heart, it may be that caffeine can reduce the risk of cardiovascular and cerebrovascular disease. Researchers should focus on how to distinguish which substance is actually beneficial and which may lead to heart disease.

Some have proposed that drinking coffee is harmful because it can be addictive and perceived as necessary to function (Rogers 2012). Caffeine has been used to treat pain and is especially useful for treating headaches (Rogers 2012). It is paired with analgesic products like ibuprofen to have a more effective impact. The concern about treating headaches with caffeine is that the headache could have been a result of caffeine withdrawal in the first place, and this would add to an addiction. However, the research on caffeine addiction is still unclear. Studies on animals have shown that caffeine does not affect the brain like cocaine or nicotine because the dopamine that is released does not actually affect the nucleus accumbens which is indicative of addiction (Satel 2006). This means that the addiction has lesser effects for caffeine compared to drugs like cocaine or nicotine. An addiction to caffeine is much different than an addiction to alcohol for example. A withdrawal symptom of a headache due to caffeine use is not as severe as *delirium tremens* from alcohol withdrawal, which could lead to death.

Satel (2006) even suggests that drinking caffeinated beverages is more of a habit than addiction. There is not the same stigma around using hard drugs as drinking coffee. Coffee is most likely consumed in a safe social setting. Other more powerful, illicit drugs are used in environments that have many risks. An addiction to heroin for instance can be very dangerous and, because it is an illegal drug, the user could face criminal charges. Coffee, tea, chocolate, and soda are legal products that are consumed in safe settings, so the addiction to such products does not have the same legal risks as other illicit drugs.

Based on the many studies conducted on caffeine consumption, the research suggests that moderate caffeine intake does not pose major health risks to consumers. In fact, there are several benefits that come

from caffeine consumption including alertness, improved physical performance, and hydration. More research may lead to more support of how caffeine can help reduce the risk of heart disease and cognitive impairment. Based on this reasoning, moderate caffeine consumption has more benefits than potential risks.

CONCLUSION

Based on the research that has been conducted, caffeine seems to have minor health risks and most of the benefits outweigh the potential for negative health outcomes. Most research cannot conclude that there is a direct link between caffeine consumption and health risks. Too much of the research is unclear and there are a lot of other variables (e.g., age, the biological composition of caffeine, sex, other drug use) that could be influencing health besides caffeine. Most of the potential risks, including feelings of anxiety and increased blood pressure, are short-term health effects that do not seem to be associated with long-term outcomes. There is not a lot of research on caffeine and this may be because caffeine is perceived as a normal substance that people have been consuming for many years, therefore the risks could be underestimated.

In order to tell whether or not caffeine can be detrimental to health, more research needs to be conducted. Research needs to focus on caffeine alone so other products cannot influence the study subjects. Using caffeine pills could be helpful. Future research should also look at moderating variables, like sex and age, to see why certain demographic variables are affected more than others. Heart disease has been related to variables like obesity, smoking, and family history and many people who drink a lot of coffee have those characteristics (Goldberg 2012). Future research has to find a way to control for those variables and to isolate caffeine as a factor. Some studies have started to look at how caffeine can reduce the risk of brain cancer, reporting that there were “borderline-significant inverse associations between glioma risk and the highest levels of intake of tea and of total coffee plus tea” (Dubrow *et al.* 2012: 766). Caffeine has been said to affect many parts of the body, but it is important to narrow down exactly what it is influencing.

As with everything people consume, caffeine intake should be done in moderate amounts, because too much of anything can have risks. Certain populations like pregnant women and children may be at higher risks for health problems, so they should be educated to monitor their use. Caffeine is a drug that many enjoy and it is a legal drug that does not have restrictions to its use. If caffeine were to be associated with major health problems, we would expect that the government would implement policies on its use as it has with tobacco and alcohol. Caffeine is in products that people consume daily, and not just for the caffeine properties. It also brings enjoyment and comfort. It is a part of social gatherings not just in the United States, but also around the world.

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