



Review of literature: Effect of stress and caffeinated beverages on the body

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GSC Biological and Pharmaceutical Sciences, 2026, 34(03), 255-257

Publication history: Received on 17 February 2026; revised on 26 March 2026; accepted on 28 March 2026

Article DOI: <https://doi.org/10.30574/gscbps.2026.34.3.0106>

Abstract

Many people worldwide adore drinking coffee because of its characteristic and unique aroma and taste, it is considered as habit and a part of the culture in many countries. For this reason, coffee is part of people's daily routines worldwide. Caffeine is a bioactive molecule that has positive and negative effects on various systems in the body especially central nervous, digestive, and respiratory systems.

Caffeine consistently increases emotional arousal, but it is unclear how it may affect other dimensions of emotion reactivity. Many studies in human found that there is an evident correlation between coffee drinking and reduced levels of perceived stress although the exact cause of these effects is still not really understood. It may also induce a harmful effect on anxiety and may increase the risk of anxiety. Caffeine is so close in structure to adenosine that it is able to bind to the receptors that are specific to adenosine, which plays an important role in understanding how caffeine acts in the human body.

The current literature reveals that stress and caffeinated beverages has an evident impact on the body through its neuroendocrine pathway and its effect on the adenosine receptors in the brain. Moderate caffeine intake can provide great benefits like enhancing alertness and improved mood.

Keywords: Stress; Coffee; Caffeine; Anxiety

1. Introduction

Stress is the most common problem in our recent life especially in light of the developments in the world and the speed advanced lifestyle (1). Because of the pressures of life, especially the working class of people, who are more vulnerable to stress and its consequent psychological and physical consequences, especially chronic stress. So, they resort to caffeinated drinks to provide them with energy and support concentration. (2)

Coffee is one of the most widespread beverages in the world and it contains caffeine which is considered as psychoactive substance that has a direct inducing effect on the central nervous system. Researchers found that caffeine consumption can influence the body's stress response leading to modification in cortisol secretion, mood changes. The most important cause that coffee is so popular is its ritualistic nature, which is commonly associated with social contact and relaxation. (3)

Many people worldwide adore drinking coffee because of its characteristic and unique aroma and taste, it is considered as habit and a part of the culture in many countries. For this reason, coffee is part of people's daily routines worldwide. Caffeine is a bioactive molecule that has positive and negative effects on various systems in the body especially central nervous, digestive, and respiratory systems (4)

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1.1. Conclusion

The current literature reveals that stress and caffeinated beverages has an evident impact on the body through its neuroendocrine pathway and its effect on the adenosine receptors in the brain.

2. Effects of Caffeinated Beverages and anxiety

Many researchers have addressed this topic of how coffee intake could influence the stress reaction. It has been shown in animal experiments to alleviate stress-induced activation of the hypothalamic-pituitary-adrenal (HPA) axis, resulting in decreased cortisol release and stress-related behaviors (5). Other studies in human found that there is an evident correlation between coffee drinking and reduced levels of perceived stress although the exact cause of these effects is still not really understood. It may also induce a harmful effect on anxiety and may increase the risk of anxiety. This association was more pronounced at caffeine intake doses above 400 mg. (6)

Caffeine consistently increases emotional arousal, but it is unclear whether and how it affects other dimensions of emotion reactivity. Many experiments in human have shown that caffeine mitigated emotional responses to negative situations, but not how to regulate such responses. (7)

There are many biological hypotheses that explain the correlation between caffeine and anxiety and they found that caffeine is a xanthine with effects like GABA inhibition, regulation of phosphodiesterases, activation of ryanodine receptors. (8)

One of the most important actions of caffeine on the central nervous system is that it enhances the psychostimulant effect that it includes the stimulatory antagonism of methylxanthines at the level of adenosine receptors A1, A2A, A2B, and A3, comprise the adenosine system, of which A1 and A2A bind to caffeine with high affinity and in a reversible manner at normal physiologic doses (9).

These receptors are commonly located in the hippocampus, amygdala and prefrontal cortex at which they can modify the activity of other neurotransmitters such as glutamate, gamma-aminobutyric acid (GABA), acetylcholine, 5-hydroxytryptophan, and dopamine influencing attention, alertness, and producing anxiogenic effect. Caffeine can also cause vasoconstriction and microglial cell functioning modulation which directly affect sleep, emotions and arousals. (10)

Obstruction of these receptors is associated with anxiety and caffeine is an antagonist of these receptors which increases energy metabolism in the brain but it also associated with decrease cerebral blood flow and hypoperfusion and more activation of norepinephrine neurons, and effects on the local release of dopamine, leading to anxiety (11).

The World Health Organization reported increase prevalence of anxiety all over the world especially during 2019 COVID-19 international pandemic (12). This is because of the effect of epidemic on the people like changes in sleeping habits and eating unhealthy foods and adopted unhealthy habits like increased caffeine consumption, while anxiety and stress levels are among the most reported in studies of physical and mental health (13).

Many studies reported a correlation between caffeine and anxiety like that cross-sectional analysis study conducted in Iran to examine the association between caffeine intake and symptoms of psychological disorders in adults, they confirmed a significantly lower possibility of suffering anxiety symptoms with weekly or more coffee consumption compared with no coffee consumption, this study is in agreement with other a prospective cohort study in Singapore. They reported that tea intake can reduce the anxiety symptoms (14)

The regular coffee intake has a beneficial impact on body while the excessive consumption has a harmful effect that is associated with anxiety and excessive production of stress hormones like adrenaline and cortisol, which enhance alertness and agitation. (15).

3. Conclusion

The current literature reveals that stress and caffeinated beverages has an evident impact on the body through its neuroendocrine pathway and its effect on the adenosine receptors in the brain. Moderate caffeine intake can provide great benefits like enhancing alertness and improved mood.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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