



# THE ROLE OF BEVERAGES IN REDUCING STRESS AMONG WORKING INDIVIDUALS

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## ABSTRACT

Stress levels have increased among people globally due to the fast-paced nature of modern lifestyles and rising expectations in jobs, education, and personal life. The Human body has several mechanisms to counteract stress by producing antioxidants, which are either naturally or externally supplied through foods. It is a common practice in India to consume buttermilk, tea, and fruit juices daily. The current review suggests that consuming beverages such as tea, coffee, buttermilk, and fruit juices can elevate mood and reduce overall stress. Tea consumption consistently improves self-reported alertness and arousal, whereas effects on pleasure or relaxation were less consistent. The effect of ingestion of a fruit juice drink composed of multiple fruit juices can reduce postprandial stress. The consumption of buttermilk lowers the sweat rate and the perception of feeling hot, uncomfortable, and thirsty. Caffeine, a methyl xanthine with stimulating effects on the central nervous system, acting as a mood enhancer, can reduce fatigue, as well as a countermeasure to sleepiness.

Index Terms: beverages, antioxidants, postprandial stress, caffeine, and methyl xanthine

## 1.INTRODUCTION

Stress is a negative mood <sup>(1)</sup>that leads to mental and physical problems <sup>(2)</sup>. Stress levels have increased among people globally due to the fast-paced nature of modern lifestyles and rising expectations in a job, education, and personal life. Stress can come from any events or pressures and lead to frustration, anger or nervousness <sup>(3)</sup>. It causes depression, anxiety, or concern, can be short or long-term, is perceived as outside of our coping abilities, feels unpleasant, and decreases performance <sup>(4)</sup>.

The Human body has several mechanisms to counteract stress by producing antioxidants, which are either naturally or externally supplied through foods. Heat stress is a major issue in workplaces in India and across the world. It affects workers' health and productivity, and can even threaten survival <sup>(5,7)</sup>. The situation is set to deteriorate due to climate change <sup>(6, 8,9)</sup>.

Rogers (1996)<sup>(10)</sup> reports that the effects of food on mood are mediated by physiological mechanisms and may feedback influence food preference and consumption. The beneficial effects of mood are believed to affect food and drink choices<sup>(11)</sup>. There has been substantial interest in the effects of food or drink on mood<sup>(12)</sup>. There are related studies such as the effects of drinks on fatigue reduction by Khajareen et al. (2010)<sup>(13)</sup>.

## II. CONSUMPTION OF BUTTERMILK TO REDUCE HEAT STRAIN

Consumption of fermented food, such as corn, rice, bean curd, and dairy, is often encountered in traditional societies unable to preserve food through refrigeration<sup>(14)</sup>. The current form of buttermilk being consumed by the workers in Chennai is a spiced diluted form of curd (natural yogurt). Drinking buttermilk provides the body with liquid and nutrition in an easily digestible form as well as vitamins and minerals that are lost when sweating. Buttermilk is high in protein, riboflavin, potassium, vitamin B12, and calcium<sup>(15)</sup>.

Consumption of similar diluted yoghurt drinks is seen in other hot regions such as Lassi in South-East Asia and Ayran in the Middle East. Food that has been fermented has been studied for health benefits in terms of probiotics, such as the content of live lactic acid bacteria with health benefits<sup>(15–17)</sup> and its importance in sustaining human health<sup>(18)</sup>. However, buttermilk has not been studied for its potential to mitigate heat strain, like other traditional drinks such as coconut water<sup>(19, 20)</sup>. Although some papers mention buttermilk as a home remedy effective in dissipating heat<sup>(21)</sup>.

The impacts of work in hot environments from a variety of disciplines. To investigate the benefits of drinking buttermilk, thermoregulation, and potential hydration benefits when working physically in a hot environment, compared to drinking plain water, and when no rehydration was provided. This study also included additional aims that explore other questions and methods related to hot working conditions:

a) To explore the cognitive effects of heat strain and physical work on arousal, working memory performance, and risk-taking. Increases in cortisol stress hormone concentrations have been previously reported under heat stress, physical exercise, and dehydration<sup>(22, 23)</sup>. A large number of studies have examined the relationship between exercise and cognitive performance<sup>(24, 25)</sup>. Much of the research is based on the notion that acute exercise alters how brain systems allocate mental resources, where various forms of cognitive tasks are supposed to be more demanding when performed in combination with physical exercise<sup>(26)</sup>. However, the findings are by no means clear-cut: the results range from a deleterious effect on cognitive performance to an enhancement. A confounding factor is the variety of methodological approaches applied, which makes the results hard to justly compare. The same problem is also true for the findings on the relation between dehydration and cognitive performance<sup>(27)</sup>. Therefore, we aimed to further explore the effects on cognitive performance.

b) To examine the impact of heat strain and physical work on the human gut microbiota. The gut microbial composition is important for human health and here, bacterial diversity is of significant relevance<sup>(28)</sup>. To our knowledge, the gut microbial structure has not previously been investigated in response to heat stress.

However, since heat stress has a physiological impact on the human body, we hypothesized that latent heat stress can impact the gut microbiota such as the diversity and concentrations of e.g. Enterobacteriaceae and Lactobacillus.

c) To investigate the effects of physical work and short-term heat exposure on renal function. Heat exposure impacts the body's fluid regulation in which the kidneys play an important role <sup>(29)</sup>. For example, acute effects of reduced renal blood flow have previously been seen when conducting hard physical labour in the heat, such as in marathon runners<sup>(30)</sup>. It is estimated that hard work can reduce renal blood flow by 50%<sup>(31)</sup>. In addition, an epidemic of chronic kidney disease (CKD) has spread among agricultural workers in many Central American countries with hot and humid climates<sup>(32 – 34)</sup>. Here, common risk factors are not present as the vast majority of those affected are young, normotensive, and lean male agricultural workers. However, they are exposed to repeated daily dehydration, and hard physical labor<sup>(32, 35)</sup>. Both Garcia-Trabaino et al. 2015<sup>(31)</sup> and Wesseling et al. 2016<sup>(32)</sup> found a cross-shift increase in serum creatinine in sugarcane plantations in El Salvador and Nicaragua respectively. Dehydration and heavy work may be a major cause and it is possible that continuous exposure could cause permanent damage to the kidney<sup>(36, 37)</sup>. This study investigates how short heat exposure, including physical work, would affect acute kidney function.

### III. CONSUMPTION OF FRUIT JUICE HELPS RELIEF POST-PRANDIAL STRESS

Postprandial stress induced by acute consumption of meals with a high-fat content increases the markers of cardiometabolic risk. Repeated acute dietary stress may induce persistent low-grade inflammation, playing a role in the pathogenesis of functional gut diseases. This may cause an impairment of the complex immune response of the gastrointestinal mucosa, which results in a breakdown of oral tolerance. The effect of ingestion of a fruit-juice drink (FJD) composed of multiple fruit juice and extracts, green tea extracts, and vitamin C on postprandial stress induced by a High Fat Meal (HFM) in healthy overweight subjects.

Following a double-blind, placebo-controlled, cross-over design, 15 healthy overweight subjects were randomized to an HFM providing 1334 Kcal (55% fat, 30% carbohydrates, and 15% proteins) in combination with 500 mL of a placebo drink (HFM-P) or a fruit-juice drink (HFM-FJD). Ingestion of HFM-P led to an increase in circulating levels of cholesterol, triglycerides, glucose, insulin, TNF- $\alpha$ , and IL-6. Ingestion of HFM-FJD significantly reduced plasma levels of cholesterol and triglycerides, decreasing inflammatory response mediated by TNF- $\alpha$  and IL-6. Ingestion of a fruit juice drink reduces markers of postprandial stress induced by an HFM.<sup>(38)</sup>

#### IV. CONSUMPTION OF COFFEE ENHANCES PERFORMANCE

Caffeine is present in a range of beverages (e.g., tea, coffee, soft drinks, energy drinks) and some foods (e.g., chocolate) and is the most consumed psychoactive ingredient worldwide <sup>(39)</sup>. The effect of caffeine on mood has yielded mixed results. Some have found that both caffeine consumption and the expectation of having caffeine consumption have some mood-enhancing effects. In most experimental studies, however, neither a direct effect of caffeine consumption on mood nor a “restorative” effect following sleep restriction has been identified.<sup>[40]</sup> Energy drink consumption has been shown to enhance or sustain mood and performance during mentally and physically taxing tasks compared to a placebo.<sup>[41]</sup> However, young adults found that caffeine use was linked to anxiety symptoms, particularly in males<sup>[42]</sup>.

#### V. CONSUMPTION OF TEA PROMOTES RELAXATION AND ENHANCES PERFORMANCE

Tea, an infusion prepared with the leaves of *Camellia sinensis*, is the most widely consumed drink in the world, besides water. Differences in the processing of the leaves seem to underlie the different chemical and physiological properties of green, oolong, and black tea.<sup>[43]</sup> Tea, particularly green tea, is an important source of flavonoids, namely catechins, which are strong anti-oxidants. Among catechins, epigallocatechin-3-gallate is the more powerful antioxidant in vitro and it is the most abundant polyphenol in green tea.<sup>[44]</sup>

Tea contains a large number of bioactive compounds, yet its health benefits have generally been attributed to 2 of its components: caffeine and theanine <sup>(45)</sup>. Typically, a cup of tea contains 35–61 mg of caffeine and 4.5–22.5 mg of theanine. There is a large body of evidence that caffeine is highly bioavailable because it is rapidly and almost completely absorbed <sup>(46)</sup> and readily distributed throughout all tissues of the body, including the brain.<sup>(47)</sup>

Theanine increased background (resting) activity, yet decreased activity when preparing to attend to the task stimuli <sup>(48,49)</sup>, which has been related to better performance <sup>(50)</sup>. Behavioural effects of theanine were largely absent. However, these studies were designed to measure brain activity rather than behavioural effects. Because caffeine and theanine are always consumed together when consuming tea, studying the effects of these ingredients in combination is more relevant than studying either ingredient in isolation.

#### VI. CONCLUSION

In conclusion, fruit juices, buttermilk, coffee, and tea are popular beverages that offer a variety of flavours and health benefits. Consumption of tea, coffee, fruit juices, and buttermilk on mood reported benefits such as relief from stress reduction, heat strain, improved digestion after meals, and support for better sleep. Whether enjoyed for refreshment, hydration, or energy, each drink caters to different tastes and preferences, making them essential choices in daily life.

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