

REVIEW ARTICLE **OPEN ACCESS**

# The Effects Energy Drinks Have on Cardiovascular Health in Adults

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## Introduction

Cardiovascular diseases remain one of the leading causes of death worldwide, and growing evidence suggests that everyday lifestyle choices, including the consumption of energy drinks, play a greater role than ever imagined. Over recent years, the consumption of energy drinks has grown rapidly, particularly among young adults, athletes, and people who want to stay alert or increase performance. These beverages usually contain high levels of caffeine, taurine, sugars, and various herbal stimulants, all of which can have an influence on the cardiovascular system in different ways [1]. Although these products are marketed as safe and beneficial to boost energy, growing research and evidence suggests that their ingredients may have measurable effects on heart rate, blood pressure, and cardiac electrical activity [2].

Existing literature has increasingly raised concerns about the consequences of energy drink consumption on cardiovascular health [1], found that energy drinks can cause elevated blood pressure, increased heart rate, and changes in the QT intervals, even in healthy adults. Similarly, [2] reported that the combination of caffeine and taurine may have synergistic effects that increase cardiac stimulation far beyond what caffeine alone would usually cause. Furthermore [3], highlighted that individuals with underlying genetic heart conditions, such as long QT syndrome, may experience a greater risk of arrhythmias after consuming energy drinks. Despite these emerging findings, much of the existing research focuses on small clinical examples or on specific groups that are at greater risk, leaving significant gaps in understanding how energy drinks affect the general adult population. Additionally, many studies only investigate short-term physiological changes, creating uncertainty about long-term cardiovascular risks.

More recent large-scale reviews and meta-analyses have further strengthened concerns regarding energy drink safety. By synthesizing data across multiple randomized trials, newer studies demonstrate that cardiovascular responses to energy drinks are consistent and reproducible, particularly with respect to blood pressure elevation. These findings suggest that the observed effects are not isolated outcomes of individual studies but reflect broader physiological patterns that warrant continued investigation.

Because energy drink consumption continues to rise globally, and as the existing research better studies both concerns and unanswered questions, it is important to investigate further effects. Therefore, the aim of this paper is to examine the impact of energy

drink consumption on cardiovascular health in adults. Particularly, the study will address the following questions:

- How does regular consumption of energy drinks affect cardiovascular markers such as heart rate and blood pressure in adults?
- Do individuals who consume higher amounts of energy drinks show greater changes in cardiovascular function compared to non-consumers?
- Are certain ingredients, such as caffeine or taurine, more strongly associated with cardiovascular responses?

This paper will review existing literature, ultimately contributing to a clearer understanding of how energy drinks influence cardiovascular health.

## Literature Review

The growing popularity of energy drinks has led researchers to investigate the potential effects they may have on cardiovascular health. These beverages commonly contain high concentrations of caffeine, taurine, sugars, and other stimulants, which may influence cardiac physiology through multiple mechanisms. Recent literature has focused on changes in cardiovascular markers such as heart rate, blood pressure, and cardiac electrical activity following energy drink consumption [1]. conducted a randomized clinical trial examining the acute cardiovascular effects of high-volume energy drink intake in healthy adults. Their findings demonstrated a significant increase in systolic and diastolic blood pressure following consumption compared to placebo beverages. Additionally, the study reported prolongation of the corrected QT interval, a change associated with an increased risk of cardiac arrhythmias. Importantly, these effects were observed even in individuals without pre-existing cardiovascular disease, suggesting that energy drinks may pose risks beyond vulnerable populations. The authors emphasized that these physiological changes could be clinically relevant, particularly when energy drinks are consumed in large quantities or over short periods of time.

These findings are reinforced by more recent meta-analytic evidence [4-6], in a systematic review and meta-analysis of

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randomized clinical trials, reported consistent increases in systolic blood pressure within hours of energy drink consumption among healthy adults. While changes in heart rate and QT intervals were not uniformly significant across all the included studies, the overall pattern supported a reproducible pressor response. When considered alongside [1], this synthesis strengthens the argument that blood pressure elevation is one of the most reliable acute cardiovascular effects of energy drinks.

Supporting these findings [2], performed a systematic review analyzing multiple studies on the cardiovascular effects of energy drinks. Their review confirmed consistent evidence of elevated heart rate and blood pressure following consumption. A key observation was the potential synergistic effect between caffeine and taurine. While caffeine is known to increase sympathetic nervous system activity, taurine may modify calcium handling in cardiac cells, together amplifying cardiac stimulation more than caffeine alone. This interaction may help explain why energy drinks often produce stronger cardiovascular responses than other caffeinated beverages such as coffee [2], also highlighted concerns regarding repeated or habitual consumption. Although many studies focused on short-term outcomes, the authors noted that frequent exposure to stimulants could contribute to sustained cardiovascular age stress. However, they acknowledged a lack of long-term cohort studies, limiting conclusions regarding chronic cardiovascular disease development. This gap in evidence remains a major limitation in current research.

Beyond resting cardiovascular measures, several studies have examined energy drink effects during physical exertion. A systematic review of randomized control trials assessing cardiovascular responses during exercise found that energy drink consumption led to modest but statistically significant increases in heart rate and systolic blood pressure compared to control beverages. These findings suggest that energy drinks may amplify cardiovascular responses during periods of physiological stress, a concern given their frequent use before or during athletic activity. Such results complement resting-state studies by demonstrating that stimulant-related cardiovascular effects persist across different physiological contexts.

Further insight into high-risk populations was provided by the [3], which reported that energy drink consumption may trigger cardiac arrhythmias in individuals with underlying genetic heart diseases, such as long QT syndrome. According to their findings, the stimulant component of energy drinks can exacerbate electrical instability in the heart, increasing susceptibility to dangerous rhythm disturbances. While these results primarily apply to individuals with known genetic conditions, they raise broader safety concerns, particularly given that many people may be unaware they have such disorders. Collectively, the existing literature demonstrates a consistent association between energy drink consumption and measurable cardiovascular effects, including increased energy drink consumption and measurable cardiovascular effects, including increased blood pressure, altered heart rate, and changes in cardiac electrical activity. However, most studies examine acute responses rather than long-term outcomes, and many rely on relatively small sample sizes. Furthermore, limited research has evaluated dose-dependent effects or compared habitual consumers with non-consumers over extended periods. As a result, while short-term cardiovascular changes are well documented, the long-term implications for the general adult population remain unclear.

## Conclusion

The existing body of literature provides compelling evidence that energy drink consumption has measurable effects on cardiovascular health in adults. Across randomized clinical trials, systematic reviews, and meta-analyses, consistent physiological changes have been observed following energy drink consumption. These include elevations in systolic and diastolic blood pressure, increases in heart rate, and alterations in cardiac electrical activity, such as QT interval prolongation. Importantly, these effects have been documented not only in individuals with underlying cardiovascular conditions but also in healthy adult populations, indicating that energy drinks may pose broader cardiovascular risks than previously assumed.

Evidence further suggests that the magnitude of cardiovascular effects is influenced by the quantity of energy drinks consumed. High volume intake has been associated with more pronounced blood pressure elevations and electrocardiographic changes, indicating a dose-related physiological response. Additionally, findings from exercise-based studies suggest that energy drinks may amplify cardiovascular stress during physical activity, a context in which these beverages are commonly used. This interaction between stimulant intake and physiological exertion may increase cardiovascular strain, particularly in individuals who consume energy drinks regularly or in large amounts.

The role of individual ingredients also appears to be central to understanding these effects. Caffeine has been consistently identified as a primary driver of sympathetic stimulation and blood pressure elevation. However, evidence indicates that other components, such as taurine, may interact synergistically with caffeine, enhancing cardiac stimulation beyond what caffeine alone would produce. This complex interaction underscores the challenge of isolating the cardiovascular impact of individual ingredients and highlights the need for further mechanistic research.

Despite growing evidence on acute cardiovascular responses, substantial gaps remain regarding long-term health outcomes. Most existing studies focus on short-term physiological changes, limiting conclusions about chronic cardiovascular disease risk associated with habitual energy drink consumption. Longitudinal studies involving larger and more diverse populations are needed to clarify whether repeated exposure contributes to sustained hypertension, arrhythmias, or other adverse cardiovascular outcomes.

Given the widespread and increasing consumption of energy drinks, particularly among young adults, these findings carry important clinical and public health implications. Greater awareness, clearer labeling, and evidence-based consumption guidelines may be necessary to mitigate potential risk. Continued research will be essential to inform both healthcare professionals and the public about the cardiovascular effect of energy drinks and to guide safer consumption practices.

## Author's Statement

Being the author of the submitted paper, I declare that the thesis is original, prepared by me, and does not contain materials published, accepted for publication, or defended so far by other authors that are not mentioned or cited in accordance with the relevant rules.

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