MRS Journal of Multidisciplinary Research and Studies
ISSN *(Online) 3049-1398*
Vol-3, Iss-8 (August-2026)
Journal homepage: https://mrspublisher.com/journals

The Effect of Energy Drink Consumption on a Sample of Students from Al-Musaib Technical Institute and Its Relationship with Physiological Parameters

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Received: 22 / 06 / 2026	Accepted: 02 / 08 / 2026	Published: 17 / 08 / 2026

Abstract: The widespread consumption of energy drinks has become common among different segments of society, especially among young people, due to their association with increased overall physical activity. The general effect of these drinks is attributed to their content of active ingredients such as caffeine, various sugars, taurine, as well as some herbal extracts.

The present study aimed to evaluate the potential physiological effects of these beverages on several vital body indicators, including heart rate, blood glucose level, and blood pressure. The research was conducted on 32 student volunteers (28 males, 87.5%, and 4 females, 12.5%). Vital indicators were measured before the consumption of energy drinks and again two hours after intake.

The results of the current study indicated a slight increase in heart rate after consumption; however, this effect was not statistically significant. In contrast, systolic blood pressure showed a strong statistical association after the intake of energy drinks, indicating a clear effect of these beverages on blood pressure. As for blood glucose levels, the effect was moderate but statistically significant, suggesting that the increase in glucose levels after consuming energy drinks was not random but clearly associated with the intake.

Finally, there was no correlation between weight, gender, and the consumption of energy drinks, as the study was conducted over a short (cross-sectional) period.

Keywords: *Energy drinks; Caffeine; Heart rate; Blood pressure; Blood glucose; Physiological effects; Young adults; Vital signs; Energy beverage consumption; Cardiovascular response.*

Cite this article: Al-Gburi, N. M. A. (2026). The Effect of Energy Drink Consumption on a Sample of Students from Al-Musaib Technical Institute and Its Relationship with Physiological Parameters. *MRS Journal of Multidisciplinary Research and Studies, 3(8), 29-32.*

Introduction

In recent decades, the global consumption of energy drinks (EDs) has surged exponentially, particularly among adolescents and young adults seeking enhanced cognitive performance and physical endurance[1]. Unlike traditional soft drinks, energy drinks are characterized by high concentrations of caffeine, often supplemented with proprietary "energy blends" containing taurine, guarana, L-carnitine, and glucuronolactone[2]. While marketed as functional beverages, the synergistic effects of these ingredients on human physiology have raised significant public health concerns, particularly regarding cardiovascular stability and metabolic health [3].

The most immediate effects of energy drinks are observed within the cardiovascular system. Research indicates that the high caffeine content acts as a potent adenosine receptor antagonist, leading to an increase in sympathetic nervous system activity[4]. This physiological shift typically manifests as a significant rise in systolic and diastolic blood pressure and an elevated resting heart rate (pulse). Clinical trials have demonstrated that even a single serving can induce "caffeine-induced palpitations" and, in some cases, prolong the QT interval, increasing the risk of cardiac arrhythmias [5].

Beyond the acute cardiovascular response, the high glycemic load of energy drinks—often containing excessive amounts of sucrose and high-fructose corn syrup—poses a long-term risk to metabolic homeostasis. Frequent consumption is strongly correlated with a higher Body Mass Index (BMI) and an increased risk of obesity due to the intake of "empty calories.[6]" Furthermore, the rapid absorption of liquid sugars triggers a sharp spike in blood glucose levels, forcing a compensatory insulin response. Over time, this cycle can contribute to insulin resistance and a higher predisposition toward Type 2 Diabetes Mellitus [7].

Aim of this study: is to evaluate the acute effects of consuming energy drinks on cardiovascular and metabolic parameters by assessing changes in blood pressure, resting heart rate, and blood glucose levels, particularly among adolescents and young adults who frequently consume these beverages.

Materials and Methods

Study design and setting

A descriptive cross-sectional study was conducted on a sample of students from Al- Musaib Technical Institute. The study was carried out during the academic year 2026 at the institute's campus.

Participants

The study included 32 students (28 males and 4 females) who were selected randomly from different departments of the institute. All participants were apparently healthy and agreed voluntarily to participate in the study.

Instruments

The following instruments were used to measure the study variables:

1. Sphygmomanometer to measure blood pressure.
2. Glucometer to measure capillary blood glucose level.

Pulse oximeter to measure heart rate (pulse rate).

Data collection form

Data for each participant were recorded using a specially designed information form that included the following items:

1- Sample Number: .....

2- Date: ...../...../ 2026

3- Gender: Male ( ) / Female ( )

4- Age: .....

5- Height: .....

6- Weight: .....

7- General Health Status: ( ) Healthy / ( ) Has a disease (please specify the disease and its duration)

8- Does the participant frequently consume energy drinks? (If yes:)

9- Number of cans consumed daily and can size: ....

10- Blood Pressure: ..... Heart Rate: ..... Blood Glucose Level: ..... (Before consuming energy drinks)

11- Blood Pressure: ..... Heart Rate: ..... Blood Glucose Level: ..... (After consuming energy drinks)

Procedure

For each participant, baseline measurements of blood pressure, pulse rate, and blood glucose level were obtained before consuming the energy drink. The participants then consumed the assigned energy drink, and after a period of two hours, the same indicators were measured again using the same instruments in order to compare pre and post consumption values and assess the effect of the drink on vital parameters[8].

Statistical analysis: Data were analyzed using the Statistical Package for the Social Sciences (SPSS), version 27.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics (mean, standard deviation, frequencies and percentages) were used to summarize the demographic characteristics of the participants and the main study variables.

To assess the effect of energy drink consumption on blood pressure, heart rate, and blood glucose level, a paired samples t-test was performed to compare pre-consumption and post-consumption measurements for each variable. A p-value of less than 0.05 was considered statistically significant.

Result

Table (1): Distribution of the sample by gender and percentage

Gender	No	Percentage
Male	**28**	**87.5%**
Female	**4**	**12.5%**
Total	**32**	**100**

Table 2: Descriptive Statistical Analysis of Body Biomarkers (Blood Pressure, Pulse Rate, and Blood Glucose Levels) Before and After Energy Drink Consumption

	Minimum	Maximum	Mean	Std. Deviation
weight	50	132	75.50	18.214
cans_per_day	1	1	1.00	.000
sugar before	68	175	96.47	19.141
sugar after	67	204	103.88	26.046

Pulse rate before	65	110	86.66	11.468
Pulse rate after	65	126	91.78	12.896
systolic_bp before	8	16	11.66	1.860
systolic_bp after	8	14	11.34	1.753
diastolic_bp before	5	10	7.19	1.091
diastolic_bp after	4	11	7.37	1.718

The data present a comparison of study biomarkers before and after energy drink consumption among a sample of students from Al-Musayyib Technical Institute, with an intake of one can per day, in order to assess the potential effects of such beverages on the measured parameters.

The results indicate that blood glucose levels showed a noticeable increase two hours after the consumption of the energy drink (96.47±19.14 before and 103.88±26.04 after). In addition, the recorded pulse rate values demonstrated a slight increase following energy drink intake (86.66±11.46 before and 91.78±12.89 after).

With regard to blood pressure, systolic pressure showed a decrease, whereas diastolic pressure exhibited an increase. Body weight measurements were not considered statistically significant, as they were obtained at a single time point without any observable change, given that the intervention did not extend over a long period.

Table 3: Correlation Analysis of Physiological Biomarkers before and After Energy Drink Consumption

		Correlation	Sig.
Pair 1	Pulse rate before & Pulse rate after	0.47	0.06
Pair 2	systolic_bp before & systolic_bp after	0.58	0.000
Pair 3	diastolic_bp before & diastolic_bp after	0.09	0.59
Pair 4	sugar before & sugar after	0.52	0.02

The results presented in Table 3 indicate the correlation between the study variables and the level of significance. It can be observed that the heart rate showed a moderate correlation between the measurements taken before and after consumption, suggesting a general trend of change; however, this was not statistically significant.

In contrast, systolic blood pressure demonstrated a moderate correlation, indicating a relatively strong relationship between pre- and post-consumption measurements. This suggests that the change in systolic blood pressure was consistent and clearly influenced by the consumption of energy drinks.

As for diastolic blood pressure, it did not show a statistically significant effect, whereas the effect on blood glucose levels was statistically significant.

Discussion

The increase in blood glucose levels following energy drink consumption suggests a possible explanation that these beverages contain high and variable amounts of sugars across different commercially available brands, which typically lead to a transient elevation in blood glucose (hyperglycemia),[9, 10] followed by stimulation of insulin secretion. Scientific interpretations have confirmed that energy drinks contain high sugar concentrations that cause an immediate rise in blood glucose levels [11]. This is consistent with [12], which reported that the sugar content in energy drinks leads to a sudden “spike” in blood glucose levels, followed by a significant decline after a certain period of consumption, or a return of blood glucose to normal levels, commonly referred to as a “crash.”

While increase in heart rate was observed, which can be attributed to caffeine, as it acts by blocking adenosine receptors and increasing adrenaline secretion. In addition, its stimulatory effects on the central nervous system contribute to elevated heart rate and increased cardiac excitability. Scientific evidence indicates that caffeine enhances the electrical activity of the heart [13].

The results for systolic and diastolic blood pressure indicated a transient increase and decrease, respectively. These findings may be explained by the fact that the effect of energy drink consumption on blood pressure is not consistent and can be influenced by several factors, including physical and psychological stress, dosage, and the level of caffeine present in the various commercially available products in local markets. Therefore, the observed effects were variable due to individual differences in physiological response [13].

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