ISSN: 2457-0400

Impact Factor: 7.675

WORLD JOURNAL OF ADVANCE HEALTHCARE RESEARCH

www.wjahr.com

Volume: 10, Issue: 7

Page N. 86-90

Year: 2026

Original Article

Coden USA: WJAMA3

ACUTE EFFECTS OF CAFFEINATED COFFEE ON CARDIOVASCULAR PARAMETERS AND BLOOD GLUCOSE LEVEL IN HEALTHY YOUNG FEMALES

Hafsa Najam[1], Ruqaiya Hasan[1*], Maira Hasan[2], Esha Naseem[1]

*[1]Department of Physiology, Faculty of Science, University of Karachi, Karachi- 75270, Pakistan.
[2]Hamdard University Hospital, Taj Medical Complex, M.A, Jinnah Road, Karachi, Pakistan.

Article Received: 28 May 2026 **Article Revised:** 17 June 2026 **Article Published:** 01 July 2026

***Corresponding Author: Ruqaiya Hasan**

Department of Physiology, Faculty of Science, University of Karachi, Karachi- 75270, Pakistan.

DOI: https://doi.org/10.5281/zenodo.21023118

How to cite this Article: Hafsa Najam[1], Ruqaiya Hasan[1*], Maira Hasan[2], Esha Naseem[1]. (2026) Acute Effects Of Caffeinated Coffee On Cardiovascular Parameters And Blood Glucose Level In Healthy Young Females. World Journal of Advance Healthcare Research, 10(7), 86–90.

ABSTRACT

Background: Caffeine is a widely consumed psychoactive substance commonly present in coffee and other beverages. Acute caffeine intake has been associated with variations in cardiovascular function and glucose metabolism; however, studies regarding its short-term physiological effects remain controversial, especially among South Asian populations. **Objective:** This research aimed to evaluate the acute effects of caffeinated coffee consumption on blood pressure, heart rate, and blood glucose levels in healthy young adult females. **Methods:** A cross-sectional experimental study was conducted, comprised of 32 healthy females aged 18–30 years, selected through convenience sampling. Baseline measurements of systolic and diastolic blood pressures as well as blood glucose levels were recorded after a resting period. Participants consumed a standardized milk coffee preparation containing approximately 35–50 mg caffeine. Measurements on blood pressure and heart rate were obtained at baseline and after 30, 45, and 60 minutes intervals, while blood glucose levels were taken at baseline, 30 minutes, and 60 minutes post- coffee consumption. Data were analyzed using paired t-tests, at $p < 0.05$ to be considered statistically significant. **Results:** Caffeinated coffee consumption produced statistically non-significant changes in systolic or diastolic blood pressures throughout the experimental duration ($p > 0.05$). Heart rate reduced significantly at 30 minutes post-consumption ($p = 0.027$), whereas, subsequent changes were non-significant. Mean blood glucose level increased significantly from 95.4 ± 9.9 mg/dL at baseline to 102.3 ± 12.0 mg/dL after 30 minutes ($p = 0.004$), followed by a non-significant reduction toward baseline values at 60 minutes (98.6 ± 12.3 mg/dL; $p = 0.23$). Mild self-reported symptoms, including restlessness, dizziness, and palpitations, were also experienced by the participants. **Conclusion:** Acute caffeinated coffee consumption produced temporary effects on cardiovascular and metabolic parameters in healthy young adult females. Blood pressure remained mostly unaltered, while a transient significant decline in the heart rate and a rise in blood glucose levels were observed after 30 minutes before returning toward baseline values within 60 minutes of post - coffee consumption. These findings suggested that caffeine may induce short-term physiological alterations without causing sustained disturbances in healthy individuals.

KEYWORDS: Caffeine, Coffee consumption, Blood glucose levels, Heart rate, Blood pressure, Cardiovascular parameters, Glucose metabolism, Acute effects.

INTRODUCTION

The psychoactive agent caffeine, which can be found in coffee, tea, and many other drinks is extremely popular across the world. Caffeine primarily acts as an adenosine receptor antagonist and affects both physiological and neurological functions.[1,2] Systemically, caffeine is known to affect cardiovascular function and glucose metabolism among other influences.

Caffeine consumption acutely elevates blood pressure (BP) and heart rate (HR) through sympathetic stimulation and vascular effects.[3,4] Caffeine also has an effect on glucose metabolism by reducing insulin

sensitivity, increasing circulating catecholamines, and leading to a short-term increase in blood glucose levels (BGL).[5,6]

While many studies have tried to determine a short term effect of drinking coffee, the results have been inconsistent. Some studies reported that caffeine consumption increased BP and HR; whereas other studies reported little or no significant changes in BP or HR after the caffeine consumption, particularly among habitual coffee drinkers.[7,8] Caffeine is also known to reduce glucose tolerance; this is true for both normal and diseased populations, although the duration and magnitude of this response is not well-defined and can vary greatly.[5,9]

Most of the research has been performed on Western populations, and little data are available regarding South Asian populations, who may have different genetic, dietary, and lifestyle factors that may modulate caffeine metabolism and response.[10,11]

The purpose of this study is to determine how the ingestion of one cup of caffeinated coffee affects the cardiovascular parameters including HR and BP, and BGL of healthy young adults in an acute manner.

MATERIALS AND METHODS

Design of study and setting

The study was conducted at the Department of Physiology, University of Karachi, including the healthy adult females between the ages 18 to 30 years.

Volunteer participants were recruited via convenience sampling. The inclusion criteria for participation were being free of any chronic illness, such as hypertension, diabetes, and cardiovascular, endocrine, or neurological diseases, and not taking any medication that could affect cardiovascular function or glucose metabolism.

Pre-experimental instructions

All subjects were asked to avoid caffeine for a minimum of 12 hours before the day of data collection and must abstain from eating food for a minimum of 2 hours before participating in the study. Prior to data collection, the written consent was obtained from all volunteers of the study.

Data collection procedure

Demographic and health-related information of participants was obtained via Google Forms. Before recording the measurements on BP, HR, and BGL, participants were asked to sit comfortably and rest for about ten minutes. Each participant received a specific type and volume of standardized preparation of coffee and consumed it within a 5-minute period. The milk coffee contained approximately 1.5g of instant coffee that provided an estimated amount of caffeine between 35-50 mg, and mixed with approximately 200-250 mL of milk without added sugar.

Blood pressure and heart rate measurements

With the help of digital blood pressure monitor, the cardiovascular system related parameters, BP and HR were measured at baseline (before consuming the coffee) and, after 30, 45 and 60 minute intervals. During recordings each participant remained seated in relaxed position.

Blood glucose measurements

The digital Glucometer was used to measure BGL, at baseline (before coffee consumption), after 30 and 60 minutes of coffee consumption.

Subjective symptoms assessment

To record the symptoms experienced by the subjects after coffee consumption, all participants were provided with a feedback form at the end of the experiment. Participants reported symptoms related to experiencing palpitations, feelings of restlessness, or feelings of dizziness, or other conditions related to discomfort followed by coffee consumption.

Statistical analysis

Data were analyzed using paired t-tests. A p-value < 0.05 was considered statistically significant.

RESULTS

The data collected on 32 female participants after the consumption of coffee, the acute effects on cardiovascular parameters including BP, HR, and BGL were analyzed.

Table 1: The immediate effects of caffeinated coffee consumption on the systolic, diastolic, and heart rate measurements.

Time intervals	Systolic BP	Diastolic BP	Heart rate
0 to 30 min	Increased	Decreased	Decreased
	Non Sig.(p=0.983)	Non Sig.(p=0.622)	Sig.(p=0.027)
30 to 45 min	Increased	Increased	Decreased
	Non Sig.(p=0.252)	Non Sig.(p=0.688)	Non Sig.(p=0.165)
45 t0 60 min	Decreased	Increased	Increased
	Non Sig.(p=0.634)	Non Sig.(p=0.867)	Non Sig.(p=0.187)

Table 1 showed the changes in the systolic blood pressure (SBP), diastolic blood pressure (DBP), and HR measurements at 0 - 30, 30 - 45, and 45 - 60 minutes intervals. During the first 30 minutes, there was a non-

significant (p = 0.983) increase in SBP and a non-significant decrease in DBP (p = 0.622). However, HR decreased significantly (p = 0.027).

During 30 - 45 minute interval, both SBP and DBP increased non- significantly (p = 0.252 and p = 0.688), but HR showed a continuous non- significant reduction (p = 0.165). Between 45-60 minutes, SBP decreased while, DBP and HR increased, although these changes were also statistically non- significant (p > 0.05).

Table 2: Distribution of self-reported symptoms among participants after caffeine intake.

Symptoms category	Restless	%	Palpitations	%	Dizziness	%
None	16	50.0	21	65.62	17	53.12
Mild	11	34.38	6	18.75	10	31.25
Moderate	3	9.38	3	9.38	3	9.38
Severe	2	6.25	2	6.25	2	6.25

Self-reported symptoms by the participants following coffee consumption are summarized in Table 2. Approximately 50% of the participants did not report none of the symptoms of restlessness, palpitation or dizziness after the consumption of caffeinated coffee. Whereas, the rest of the common self- reported mild symptoms were restlessness (34.38%), dizziness (31.25%), and palpitation (18.75%), and a small proportion of participants experienced moderate to severe symptoms.

Table 3: Comparison of blood glucose levels before and after coffee consumption.

Time Point	Mean ± SD (mg/dL)	Comparison	t-value	p-value	Result
Before	95.4 ± 9.9	—	—	—	Baseline
After 30 min	102.3 ± 12.0	Before vs 30 min	-3.07	0.004	Significant
After 60 min	98.6 ± 12.3	Before vs 60 min	-1.22	0.23	Non Significant

The changes in mean BGL after the consumption of coffee at different intervals of time are summarized in Table 3; Fig. 1. The mean BGL before the consumption of caffeinated coffee was 95.4 ± 9.9 mg/dL, which significantly increased (p = 0.004) to 102.3 ± 12.0 mg / dL. After 60 minutes of consuming the coffee, the mean blood glucose concentration decreased to 98.6 ± 12.3 mg/dL, however, this reduction was statistically non-significant (p = 0.23).

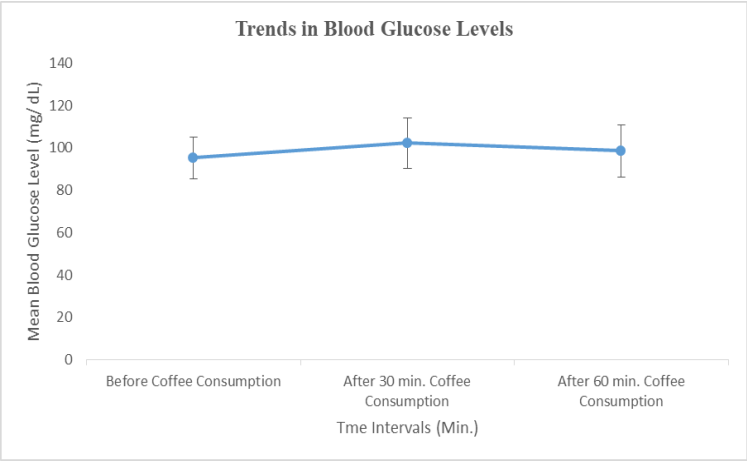

Figure 1: Changes in mean blood glucose levels before and after coffee consumption.

DISCUSSION

The acute physiological impact of caffeinated coffee consumption on cardiovascular parameters and metabolism among adult females was evaluated in the present investigation. There were no statistically significant differences in SBP or DBP after the consumption of coffee. These results aligned with the findings of other studies that have shown no impact of acute caffeine ingestion on peripheral BP (especially in habitual consumers of coffee).[4,8] In contrast, some researchers have reported that acute caffeine use caused a transitory increase in BP due to vasoconstriction and the increase in sympathetic tone resulting from antagonizing the adenosine receptors.[7,12] Individual variability, level of caffeine tolerance, as well as the timing of BP measurements may explain the variability between reported outcomes in the literature.

The statistically significant reduction in HR observed 30 minutes after the consumption of caffeine reflects a transitory vagus nerve mediated baroreflex response. The existing literature presents conflicting findings on this

subject, with some studies reporting that caffeine-induced catecholamines release increases HR, while other studies have noted only minor or no changes in HR; however, the magnitude of these changes always depend upon the physiological conditions and timing of measurement.[2,8,13]

Compared with HR, BGL showed a significant increase 30 minutes post caffeinated coffee consumption. Present findings are consistent with previous investigations indicating that caffeine decreases insulin sensitivity and increases BGL through elevated levels of catecholamine.[5,6] Research has also exhibited the caffeine induced reduction in glucose uptake by peripheral tissues and altered glucose metabolism, particularly after meals.[9]

Further, the reduction of elevated BGL levels to pre-coffee consumption values at 60 minutes, suggests that the blood glucose homeostasis is achieved through internal compensatory mechanisms in the body. Similar transient effects have been observed in previous research in healthy human subjects.[5]

Overall, the present findings indicate that caffeine exerts different short-term effects on cardiovascular and metabolic functions. The net effect of caffeine on BP is negligible, however, caffeine may produce a transient change in HR and glucose metabolism. These variations may result from differences in an individual's sensitivity to caffeine, effect of habitual caffeine consumption, and the complex relationships between caffeine and other bioactive molecules in coffee.[14,15]

CONCLUSION

Acute consumption of caffeinated coffee produced transient metabolic and cardiovascular effects in healthy young adult females. While BP remained largely unaffected, significant short-term alterations in HR and BGL were observed. These findings suggested that caffeine may temporarily influenced autonomic and glucose regulatory mechanisms, although homeostatic recovery occurred within a short duration in healthy individuals.

ACKNOWLEDGEMENT

The authors sincerely acknowledge the Chairperson, Department of Physiology, University of Karachi, for providing the support and facilities required for the completion of this research.

REFERENCES

1. Geleijnse M. Habitual coffee consumption and blood pressure: An epidemiological perspective. Vasc Health Risk Manag, 2008; 4(5): 963-970. https://doi.org/10.2147/VHRM.S3055.
2. Daniels, J. W., Molé, P. A., Shaffrath, J. D., & Stebbins, C. L. (1998). Effects of caffeine on blood pressure, heart rate, and forearm blood flow during dynamic leg exercise. Journal of applied physiology (Bethesda, Md.: 1985); 85(1): 154–159. https://doi.org/10.1152/jappl.1998.85.1.154
3. Nurminen, M. L., Niittynen, L., Korpela, R., & Vapaatalo, H. (1999). *Coffee, caffeine and blood pressure: A critical review.* *European Journal of Clinical Nutrition, 53*(11): 831–839. [https://doi.org/10.1038/sj.ejcn.1600899]
4. De Giuseppe, R., Di Napoli, I., Granata, F., Mottolese, A., & Cena, H. (2019). Caffeine and blood pressure: a critical review perspective. Nutrition Research Reviews, 32(2): 169–175. doi:10.1017/S0954422419000015
5. Thong, F. S. L., & Graham, T. E. (2002). Caffeine-induced impairment of glucose tolerance. Journal of Applied Physiology, 92(6): 2347–2352.
6. Moisey, L. L., et al. (2008). Caffeine consumption impairs insulin sensitivity. Applied Physiology, Nutrition, and Metabolism, 33(1): 130–140.
7. Corti, R., Binggeli, C., Sudano, I., Spieker, L., Hänseler, E., Ruschitzka, F., Chaplin, W. F., Lüscher, T. F., & Noll, G. (2002). Coffee acutely increases sympathetic nerve activity and blood pressure independently of caffeine content: Role of habitual versus nonhabitual drinking. Circulation, 106 (23): 2935–2940. [https://doi.org/10.1161/01.CIR.0000046228.97025.3A]
8. Green, P. J., Kirby, R., & Suls, J. (1996). The effects of caffeine on blood pressure and heart rate: A review. Annals of behavioral medicine: a publication of the Society of Behavioral Medicine, 18(3): 201–216. https://doi.org/10.1007/BF02883398
9. Lane, J. D., et al. (2004). Caffeine impairs glucose metabolism in type 2 diabetes. Diabetes Care, 27(8): 2047–2048.
10. Senftinger, J., Nikorowitsch, J., Borof, K. et al. Coffee consumption and associations with blood pressure, LDL-cholesterol and echocardiographic measures in the general population. Sci Rep., 2023; 13: 4668. https://doi.org/10.1038/s41598-023-31857-5
11. Cicero, A. F. G., Fogacci, F., D'Addato, S., Grandi, E., Rizzoli, E., Borghi, C., & on behalf of the Brisighella Heart Study. (2023).Self-Reported Coffee Consumption and Central and Peripheral Blood Pressure in the Cohort of the Brisighella Heart Study. Nutrients, 15(2): 312. https://doi.org/10.3390/nu15020312
12. Haghighatdoost, F., Hajihashemi, P., de Sousa Romeiro, A. M., Mohammadifard, N., Sarrafzadegan, N., de Oliveira, C., & Silveira, E. A. (2023). Coffee Consumption and Risk of Hypertension in Adults: Systematic Review and Meta-Analysis. Nutrients, 15(13): 3060. https://doi.org/10.3390/nu15133060
13. Green, P. J., & Suls, J. (1996). The effects of caffeine on ambulatory blood pressure, heart rate, and mood in coffee drinkers. Journal of behavioral

medicine, 19(2): 111–128. https://doi.org/10.1007/BF01857602
14. Kobylińska, Z., Biesiadecki, M., Kuna, E., Galiniak, S., & Mołoń, M. (2025). Coffee as a Source of Antioxidants and an Elixir of Youth. Antioxidants, 14(3): 285. https://doi.org/10.3390/antiox14030285
15. Rodak, K., Kokot, I., & Kratz, E. M. (2021).Caffeine as a Factor Influencing the Functioning of the Human Body-Friend or Foe. Nutrients, 13(9): 3088. https://doi.org/10.3390/nu13093088