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Evaluation of the effects of regular caffeine intake on body composition measurements and psychological status in healthy individuals

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ABSTRACT

Aims: Research continues on the health effects of caffeine, whose use is increasing among young people. It has been determined that caffeine products consumed to increase alertness have both positive and negative effects on body metabolism. In addition to metabolic effects, it is necessary to consider the psychological dimension. While it can improve exercise performance and cognitive capacity, it can also lead to sleep problems, anxiety disorders, and cardiac problems. It can also affect fluid and fat metabolism. This study investigated the metabolic and psychological effects of regular caffeine intake, as well as its impact on body composition.

Methods: Sociodemographic data were collected from individuals aged 18 and over who regularly consumed caffeine, and psychological status was assessed. Laboratory tests and body composition measurements were recorded using a bioelectrical impedance analyzer.

Results: The majority of the 176 individuals were female, had a bachelor's degree, and were low-income. The mean age was 23.3±5.2 years. The body fat percentage of high dose caffeine-consuming individuals was 29.2±9.0 %, muscle mass 27.2±7.0 kg/m2, visceral fat 9.3±4.8%, and waist/hip ratio was 0.8±0.1. Mean anxiety level was found 3.66, tension level 3.35, and depression level 2.38. Sleep problems were detected in 42.0%, palpitations in 35.2%, dyspeptic complaints in 39.8%, and bowel complaints in 26.1% of.

Conclusion: Regular caffeine consumption has been shown to affect sleep, urinary frequency, and dyspeptic complaints, but it is not a criterion that alone affects anthropometric values and psychological status. Although relatively high doses of caffeine can cause tachycardia attacks, they do not increase anxiety levels. Caffeine has also been found to be ineffective against mood disorders like depression or anxiety, and its primary use in young people is believed to be to increase alertness. However, it's important to remember that an increase in sleep problems or dyspeptic symptoms can negatively impact quality of life.

Keywords: Caffeine, anxiety, bioelectrical impedance analysis

INTRODUCTION

Caffeine is a substance that is commonly ingested through beverages such as coffee, tea, cocoa, chocolate, and guarana, and can also be found in supplements and medications. Although caffeine is present in many foods and drinks, coffee (with a content of approximately (50–70%) is the best-known source of caffeine.[1] Many studies in the literature have examined the health effects of caffeine use.[2] Positive effects reported include enhanced exercise performance and cognitive capacity, and reduced fatigue.[3] Reported adverse effects include mood changes, sleep disturbances, anxiety disorders, diuretic effects, fluid electrolyte imbalances, cardiac problems, and disruptions in bone metabolism.[4]

Caffeine is associated with the release of neurotransmitters such as dopamine and serotonin, which influence mood changes.[5] Symptoms resulting from caffeine consumption may vary between individuals.[6] Generally, moderate caffeine consumption has been found to improve depressive symptoms, whereas insufficient intake, abrupt cessation, or excessive intake has been associated with increased anxiety.[7] Caffeine is one of the well-known chemical stimulants; after ingestion it enters the circulation within 45 minutes. Although the duration of effect varies by individual, it commonly lasts between 2.5 and 4.5 hours. Its well-known effects include reduction of fatigue and increased alertness.

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In addition, caffeine is known to suppress appetite and contribute to weight loss. However, at high doses it may increase blood pressure, especially cause anxiety disorders and prolonged sleep latency. Abrupt cessation of regular use may lead to withdrawal symptoms such as headache and a depressed mood.

Natural caffeine is found in coffee beans, tea leaves, cocoa beans, guarana fruits, and yerba mate leaves. Caffeine preparations may be added to beverages, foods, tablets, or powdered supplements. In the United States, approximately 85% of adults consume caffeine daily, with an average intake of 135 mg per day (equivalent to a 12-oz cup of coffee). The most common source of caffeine for adults is coffee, while for younger individuals it is soft drinks and tea.[5] According to the 2015 report of the European Food Safety Authority (EFSA), a daily caffeine intake of 200 mg/day (for a 70 kg adult) or 3 mg/kg/day is considered safe for children, adolescents, and adults and does not pose a health problem.[8] Although different types of coffee contain varying amounts of caffeine, one cup of coffee contains approximately 100 mg of caffeine on average.[9]

The aim of this study was to determine the effects of regular coffee consumption on body composition and biochemical parameters by evaluating the sociodemographic characteristics of individuals who regularly drink coffee.

METHODS

All individuals were informed about the research and written informed consent was obtained. The study was approved by the Yozgat Bozok University Non-interventional Researches Ethics Committee (Date: 22.01.2025, Decision No: 2025-GOKAEK-252_2025.01.22_321). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki. As the analyzed raw data did not include personally identifiable information, anonymity and confidentiality were guaranteed.

This single-center, prospective study included individuals aged 18 years and older who consumed caffeine. Sociodemographic data were recorded and anthropometric measurements were performed. Body composition was assessed using bioelectrical impedance analysis (BIA), focusing on fat and muscle mass. Blood samples were taken after an 8-hour fast. Daily/weekly caffeine intake in mg/day was calculated by questioning individuals about their consumption frequency of tea, coffee, soft drinks, and chocolate. Psychological status was assessed using a 10-point Likert scale included in a demographic form prepared by the researchers.

Statistical Analysis

Data were evaluated using SPSS 25.0 program. Descriptive statistics were given as number and percentage for categorical variables, and mean and standard deviation for quantitative variables. Pearson Chi-square/Fisher Exact test was used in the analysis of categorical data. Kolmogorov-Smirnov/Shapiro Wilk tests were used to check the suitability of the data for normal distribution. Student t test was used to compare the numerical characteristics in 2 groups for data that conformed to normal distribution, and Mann-Whtiney U test was used for those that did not. The statistical significance level was accepted as $p<0.05$ for all tests used.

RESULTS

The sociodemographic characteristics of the 176 individuals included in the study are shown in Table 1. The study, which was predominantly female, consisted mostly of individuals with bachelor's degrees and low incomes. Sleep disturbances were observed in 42% of individuals, palpitations in 35.2%, frequent urination in 27.8%, and bowel problems in 25.6%. Approximately 70 % had a normal body-mass index (BMI). About one-third of the individuals consumed more than 4 cups of Turkish coffee or Nescafe per month.

Table 1. Sociodemographic characteristics

Variable	Number (n)/percentage (%)
Gender	
Female	103 (58.5%)
Male	73 (41.5%)
Education level	
High school	16 (9.1%)
Bachelor's degree	138 (78.4%)
Master's degree	22 (12.5%)
Marital status	
Married	25 (14.2%)
Single	138 (78.4%)
In a relationship	13 (7.4%)
Income level	
Low	127 (72.1%)
Medium	40 (22.7%)
High	9 (5.2%)
Occupation	
Unemployed	12 (6.8%)
Civil servant	38 (21.6%)
Worker	3 (1.7%)
Self-employed	3 (1.7%)
Other	120 (68.2%)
Alcohol consumption	38 (21.6%)
Smoking	50 (28.4%)
Regular exercise	50 (28.4%)
Sleep disturbance	74 (42%)
Palpitation	62 (35.2%)
Dyspepsia	70 (39.8%)
Frequent urination	49 (27.8%)
Bowel problems	
None	131 (74.4%)
Diarrhea	20 (11.4%)
Constipation	25 (14.2%)
Turkish coffee consumption	
Once a week	62 (35.2%)
Twice a week	34 (19.3%)
Three times a week	16 (9.1%)
Four or more times a week	64 (36.4%)
Instant coffee consumption	
1 cup per week	69 (39.4%)
2 cups per week	25 (14.2%)
3 cups per week	18 (10.2%)
≥4 cups per week	64 (36.4%)
Body mass index (BMI) (kg/m²)	
Underweight	8 (4.5%)
Normal	122 (69.3%)
Overweight	31 (17.6%)
Obese	12 (6.8%)
Morbidly obese	3 (1.8%)

Anthropometric measurements, body composition analysis, and laboratory data of the individuals are shown in Table 2. The mean age in the study, which included young people, was

23.3±5.2 years. In this group, the mean BMI and waist-to-hip ratio were within the normal range. Among the biochemical parameters, serum iron, ferritin, vitamin B12, folate, glucose, and cholesterol levels were within the normal range, while vitamin D levels were low.

Table 2. Anthropometric measurements, body composition analysis, and laboratory data

Variables (n=176)	Median±SD
Age (years)	23.3±5.2
Height (cm)	169.9±9.7
Weight (kg)	69.6±15.2
Body-mass index (BMI) (kg/m²)	23.9±3.9
Waist circumference (cm)	78.4±14.2
HbA1c (%)	5.1±0.5
Folate (ng/ml)	7.0±4.1
LDL (mg/dl)	91.8±25.9
Glucose (mg/dl)	84.2±11.7
Vitamin D (ng/ml)	16.1±7.6
Triglycerides (mg/dl)	97.4±56.8
Insulin	14.5±11.0
Vitamin B12 (pg/ml)	359.0±148.0
HDL (mg/dl)	54.9±14.9
Systolic blood pressure (mmHg)	122.5±11.3
Diastolic blood pressure (mmHg)	76.9±6.3
Ferritin (ng/ml)	55.4±49.2
Iron (µg/dl)	101.5±97.5
Total iron binding capacity	267.0±67.2
Waist-to-hip ratio	0.8±0.1
Visceral fat level	9.3±4.8
Skeletal muscle mass (kg/m²)	27.2±7.0
Body fat percentage (%)	29.2±9.0
Degree of obesity (%)	114.7±19.2

SD: Standard deviation, LDL: Low density lipoprotein, HDL: High-density lipoprotein

Table 3 evaluates the parameters affecting individuals' mood. Any significance was found between mood scores and gender (p=0.86), alcohol use (p=0.08), marital status (p=0.96), income (p=0.61), occupation (p=0.37), regular exercise (p=0.47), or BMI (p=0.93). Individuals who consumed Turkish coffee more frequently had significantly lower psychological evaluation scores (p=0.04), while no difference was observed for Nescafe. Younger age and lower education level were significantly associated with higher caffeine intake (p=0.01). Individuals reporting sleep problems (p=0.02), indigestion (p<0.001), frequent urination (p=0.02), and bowel irregularities (p=0.04) had higher psychological scores. The average anxiety level is 3.66, the tension level is 3.35, and the depression level is 2.38 (out of 10).

DISCUSSION

In recent years, caffeinated beverages (especially coffee) have become increasingly popular worldwide, particularly among young people. One of the main reasons for this is the ability to wake up faster in the mornings and stay alert throughout the day, especially while attending classes. Studies have shown a positive correlation between higher levels of education and caffeine intake[10] indeed, in our study, 77.3% of caffeine-consuming participants held a bachelor's degree.

Table 3. Parameters affecting mood in individuals with regular caffeine consumption

		Median±SD	p
Gender	Female	22.6±13.7	0.25
	Male	20.1±14.2	
Alcohol consumption	Present	21.7±14.0	0.86
	Absent	160.6±11.2	
Smoking	Present	18.7±13.8	0.08
	Absent	22.8±13.9	
Regular exercise	Present	20.0±12.4	0.47
	Absent	22.2±14.5	
Sleep disorder	Present	25.0±14.9	0.02
	Absent	19.4±12.9	
Palpitation	Present	23.7±15.4	0.29
	Absent	20.5±13.1	
Bowel problem	Absent	19.9±13.3	0.04
	Diarrhea	24.7±11.9	
	Constipation	28.0±16.8	
Dyspepsia	Present	26.8±15.1	<0.001
	Absent	18.4±12.2	
Frequent urination	Present	26.5±15.6	0.02
	Absent	20.0±13.0	
Educational status	High school	27.2±15.9	0.01
	Bachelor's degree	22.2±13.8	
	Postgraduate	13.3±10.7	
Marital status	Married	20.2±12.7	0.96
	Single	21.8±14.3	
	In a relationship	20.7±12.5	
Income	Low	22.1±13.7	0.61
	Medium	19.3±14.9	
	High	22.2±15.3	
Occupation	Unemployed	30.1±17.2	0.37
	Civil servant	18.8±12.4	
	Worker	14.0±0.0	
	Self-employed	19.0±25.4	
	Other	21.6±13.7	
Weekly Turkish coffee consumption	1 cup	24.2±14.2	0.04
	2 cup	24.3±13.5	
	3 cup	15.6±12.9	
	≥4 cup	18.8±13.6	
Weekly instant coffee consumption	1 cup	21.2±12.8	0.29
	2 cup	23.7±13.1	
	3 cup	27.3±17.9	
	≥4 cup	19.7±14.3	
Body-mass index (BMI) (kg/m²)	Underweight	19.5±5.8	0.93
	Normal/healthy	20.5±12.4	
	Overweight	23.9±16.9	
	Class I obesity	24.1±18.8	
	Class II obesity	27.3±24.8	

SD: Standard deviation

The question of "at what doses caffeine has beneficial effects on human health or at what intake levels it becomes harmful" remains controversial. In our study, high caffeine consumption was associated with increased diuresis and dyspeptic symptoms as well as sleep irregularity; Turkish

coffee had a stronger effect compared to Nescafe. Any association with alcohol or smoking was found. Tachycardia was observed in approximately one-third of individuals.

Daily caffeine intake above 300 mg has been proposed to increase frequent urination.[11] In a group with regular coffee consumption (average 308 mg/day), no significant changes in total body water or body weight were found even after 3 days of coffee and water intake.[12] Similarly, our study found increased diuresis with no significant change in total body water.

Several studies report that caffeine increases dyspeptic symptoms, gastritis, and gastroesophageal reflux disease.[13] However, some studies have found any association between coffee consumption and dyspeptic complaints,[14,15] possibly due to varying caffeine doses.

Although low doses of caffeine (60 mg/day) have been reported to have no effect on sleep patterns, long-term or high-dose consumption may lead to insomnia.[16,17] In our study, high-dose coffee consumption was associated with sleep disturbances in nearly half of the individuals.

In a study of sedentary young adults aged 18-25, BMI and body fat percentage were lower compared to our group of caffeine consumers; however, waist/hip ratios were similar.[18] Another study in a similar age group reported a body fat percentage of 32.78%.[19] In our study, body fat percentage was 29.2±9.0%. Although waist/hip ratios and visceral fat percentages were in the normal range, total body fat was near the upper limit.

Limited literature exists on the relationship between coffee consumption and muscle mass. Some studies have found lower muscle mass among older adults consuming ≥3 cups of coffee per day,[20] while others report higher muscle mass with moderate coffee intake in older adults.[21] In our study, individuals consuming ≥4 cups per week had an average muscle mass of 27.2±7.0 kg/m^2. Another study in young adults reported muscle mass of 44.30±8.77 kg/m^2.[22] Increased coffee intake may negatively influence muscle mass.

Moderate caffeine consumption has been associated with mood enhancement and relaxation, while high doses have been linked to increased tension, restlessness, and irritability.[11] Studies examining caffeine and anxiety show inconsistent results; one analysis found lower anxiety in coffee drinkers compared to non-drinkers,[23] while another study reported increased anxiety with caffeine intake.[24] In our study, anxiety rates were low, supporting literature suggesting no clear association. Some literature indicates that higher caffeine intake may be associated with lower depressive symptoms;[25] our findings similarly showed low depression symptom scores. Conversely, some studies report increased depression with caffeine.[26]

Limitations

The study was conducted only on a young population. Female dominance was present. A study with a larger sample size and a more similar gender ratio could have been conducted. Participants were evaluated based on whether they consumed Turkish coffee or other types of coffee. Differentiation between other coffee types could have been made. Whether caffeine intake occurred during the day or night could have been determined. Caffeine intake doses could have been further clarified. More biochemical parameters, such as HOMA-IR, could have been studied. These are the limitations of our study.

CONCLUSION

As a result, caffeine consumption was found to have the most significant effect on anxiety and the least effect on depression. Regular caffeine consumption was associated with sleep disturbances, frequent urination, and dyspeptic symptoms, but was not found to be an independent predictor of anthropometric measurements or psychological status. Caffeine, a frequently consumed, diverse, and significant stimulant in the diet, requires further research into its effects on health. We believe that these studies should include childhood age groups, particularly to determine the long-term effects of caffeine. Therefore, more randomized controlled trials involving larger population groups are needed to clarify the causal relationships between caffeine intake, anthropometric measurements, and psychological outcomes.

ETHICAL DECLARATIONS

Ethics Committee Approval

The study was approved by the Yozgat Bozok University Non-interventional Researches Ethics Committee (Date: 22.01.2025, Decision No: 2025-GOKAEK-252_2025.01.22_321).

Informed Consent

Written informed consent was obtained from all individual participants prior to their inclusion in the study. Participants were fully informed about the study's aims, procedures, potential risks and benefits, and their rights—including the right to withdraw at any time without consequence. All participants voluntarily signed a written informed consent form.

Peer Review Process

This manuscript was subject to external peer review.

Conflict of Interest

The authors declare no conflicts of interest related to this study.

Financial Disclosure

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Author Contributions

Concept: H.K.; Design: H.K., B.G.[1]; Control: H.K., B.G.[1], Z.T.O.; Resources: H.K., B.G.[1]; Materials: H.K., B.G.[1], B.G.[2]; Data Collection and/or Processing: H.K., B.G.[1], B.G.[2]; Analysis and/or Interpretation: H.K., B.G.[1], B.G.[2], Z.T.O.; Literature Review: H.K., Z.T.O.; Writing the Article: H.K., Z.T.O.; Critical Review: H.K., B.G.[1], B.G.[2], Z.T.O.

REFERENCES

1. Abalo R. Coffee and caffeine consumption for human health. *Nutrients*. 2021;13(9):2918. doi:10.3390/nu13092918

2. Rochat C, Eap CB, Bochud M, Chatelan A. Caffeine consumption in Switzerland: results from the first national nutrition survey MenuCH. *Nutrients*. 2019;12(1):28. doi:10.3390/nu12010028
3. Maqsood U, Zahra R, Latif MZ, Athar H. Caffeine consumption & perception of its effects amongst university students. *Proceedings of Shaikh Zayed Medical Complex Lahore*. 2020;34(4):46-51. doi:10.47489/p000s344z770mc
4. Pereira-Morales AJ, Casiraghi LP, Adan A, Camargo A. Mood rhythmicity is associated with depressive symptoms and caffeinated drinks consumption in South American young adults. *Chronobiol Int*. 2019;36(2):225-236. doi:10.1080/07420528.2018.1530257
5. Lucas M, Mirzaei F, Pan A, et al. Coffee, caffeine, and risk of depression among women. *Arch Intern Med*. 2011;171(17):1571-1578. doi:10.1001/archinternmed.2011.393
6. Yang A, Palmer AA, de Wit H. Genetics of caffeine consumption and responses to caffeine. *Psychopharmacology (Berl)*. 2010;211(3):245-257. doi:10.1007/s00213-010-1900-1
7. Yin J, Ding Y, Xu F, et al. Does the timing of intake matter? Association between caffeine intake and depression: evidence from the National Health and Nutrition Examination Survey. *J Affect Disord*. 2023;340:362-368. doi:10.1016/j.jad.2023.07.115
8. EFSA Panel on Dietetic Products, Nutrition and Allergies. Scientific opinion on dietary reference values for iron. *EFSA J*. 2015;13:4254.
9. Frary CD, Johnson RK, Wang MQ. Food sources and intakes of caffeine in the diets of persons in the United States. *J Am Diet Assoc*. 2005;105(1):110-113. doi:10.1016/j.jada.2004.10.027
10. Champlin SE, Pasch KE, Perry CL. Is the Consumption of energy drinks associated with academic achievement among college students? *J Prim Prev*. 2016;37(4):345-359. doi:10.1007/s10935-016-0437-4
11. Antonio J, Newmire DE, Stout JR, et al. Common questions and misconceptions about caffeine supplementation: what does the scientific evidence really show? *J Int Soc Sports Nutr*. 2024;21(1):2323919. doi:10.1080/15502783.2024.2323919
12. Armstrong LE, Pumerantz AC, Roti MW, et al. Fluid, electrolyte, and renal indices of hydration during 11 days of controlled caffeine consumption. *Int J Sport Nutr Exerc Metab*. 2005;15(3):252-265. doi:10.1123/ijsnem.15.3.252
13. Nehlig A. Effects of coffee on the gastro-ıntestinal tract: a narrative review and literature update. *Nutrients*. 2022;14(2):399. doi:10.3390/nu14020399
14. Lien HC, Chen GH, Chang CS, Kao CH, Wang SJ. The effect of coffee on gastric emptying. *Nucl Med Commun*. 1995;16(11):923-926. doi:10.1097/00006231-199511000-00008
15. Boekema PJ, van Dam van Isselt EF, Bots ML, Smout AJ. Functional bowel symptoms in a general Dutch population and associations with common stimulants. *Neth J Med*. 2001;59(1):23-30. doi:10.1016/s0300-2977(01)00128-0
16. Saimaiti A, Zhou DD, Li J, et al. Dietary sources, health benefits, and risks of caffeine. *Crit Rev Food Sci Nutr*. 2023;63(29):9648-9666. doi:10.1080/10408398.2022.2074362
17. Liu QS, Deng R, Fan Y, et al. Low dose of caffeine enhances the efficacy of antidepressants in major depressive disorder and the underlying neural substrates. *Mol Nutr Food Res*. 2017;61(8):10.1002/mnfr.201600910. doi:10.1002/mnfr.201600910
18. Uğraş Z, Özdenk Ç. Biyoelektrik impedans yöntemi ve antropometrik ölçümler ile vücut kompozisyon analizinin sedanter genç erkek ve kadınlarda karşılaştırmalı olarak değerlendirilmesi. *Sağlık Bilimleri Derg*. 2020;29(1):14-18. doi:10.34108/eujhs.578119
19. Karakaş S, Taşer F, Yıldız Y, Köse H. Tıp fakültesi ve spor yüksekokulu öğrencilerinde biyoelektriksel impedans analiz (BİA) yöntemi ile vücut kompozisyonlarının karşılaştırılması. *Adnan Menderes Üniversitesi Tıp Fakültesi Dergisi*. 2005;6(3):5-9.
20. Chung H, Moon JH, Kim JI, Kong MH, Huh JS, Kim HJ. Association of coffee consumption with sarcopenia in Korean elderly men: analysis using the Korea National Health and Nutrition Examination Survey, 2008-2011. *Korean J Fam Med*. 2017;38(3):141-147. doi:10.4082/kjfm.2017.38.3.141
21. Kim JH, Park YS. Light coffee consumption is protective against sarcopenia, but frequent coffee consumption is associated with obesity in Korean adults. *Nutr Res*. 2017;41:97-102. doi:10.1016/j.nutres.2017.04.004
22. Günşen U, Eseceli H, Selçuk KT, Atan RM. Üniversite öğrencilerinde vücut kompozisyonu ve antropometrik ölçümlerin uyku süresi ve uyku kalitesiyle ilişkisi. *IGUSABDER*. 2022;(18):751-769. doi:10.38079/igusabder.1096981
23. Klevebrant L, Frick A. Effects of caffeine on anxiety and panic attacks in patients with panic disorder: a systematic review and meta-analysis. *Gen Hosp Psychiatry*. 2022;74:22-31. doi:10.1016/j.genhosppsych.2021.11.005
24. Liu C, Wang L, Zhang C, et al. Caffeine intake and anxiety: a meta-analysis. *Front Psychol*. 2024;15:1270246. doi:10.3389/fpsyg.2024.1270246
25. Iranpour S, Sabour S. Inverse association between caffeine intake and depressive symptoms in US adults: data from National Health and Nutrition Examination Survey (NHANES) 2005-2006. *Psychiatry Res*. 2019;271:732-739. doi:10.1016/j.psychres.2018.11.004
26. EFSA Panel on Dietetic Products, Nutrition and Allergies. Scientific opinion on the safety of caffeine. EFSA J. 2015;13(5):4102.