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Use of Caffeine and Energy Drinks Among Medical Students

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ABSTRACT

Introduction: Caffeine is the most extensively used psychoactive compound globally and is frequently consumed by medical students to maintain wakefulness, reduce fatigue, and improve academic performance. In recent years, increasing energy drink consumption among university students has raised concerns about excessive caffeine intake and its associated health hazards.

Objective: To determine the prevalence and patterns of caffeine and energy drink consumption among medical students; investigate factors influencing use; identify academic and health consequences; and assess knowledge regarding adverse effects and the safe daily caffeine dose.

Methods: An exploratory descriptive cross-sectional study was conducted among undergraduate medical students at the International Medical Faculty, Osh State University, Kyrgyzstan. Data were collected via a structured electronic questionnaire administered through Google Forms. The survey covered demographic information, caffeine consumption patterns, reasons for consumption, academic and health effects, adverse effects, withdrawal symptoms, and safety knowledge.

Results: From a total sample of 145 students, the largest age group was 20–22 years (35.2%). Females constituted 54.5% of respondents. Daily caffeine use was reported by 22.1%, while 24.1% had never consumed caffeine. Coffee was the most common caffeine source (25.5%), followed by tea and caffeine supplements (20.7% each). Anxiety/jitteriness (31 cases), insomnia (28), and palpitations (25) were the most frequent adverse effects. Withdrawal symptoms were prevalent, affecting 79 respondents frequently or always.

Although 85 students (58.6%) were aware of the 400 mg/day safety threshold, risky behaviours such as combining energy drinks with stimulants or alcohol remained common.

Conclusion: Caffeine intake is highly prevalent among medical students, strongly associated with academic pressure and examination stress. Despite perceived benefits in alertness and concentration, excessive use is accompanied by considerable adverse health effects. Educational interventions on safe caffeine use are warranted.

Keywords: *Caffeine; Energy Drinks; Medical Students; Academic Achievement; Caffeine Consumption; Adverse Effects; Caffeine Withdrawal; Cross-Sectional Study*

I. INTRODUCTION

Caffeine is the most extensively used psychoactive drug globally, found in coffee, tea, soft drinks, energy drinks, chocolate, and dietary supplements. Acting as a central nervous system stimulant, it is regularly consumed to improve alertness, concentration, combat fatigue, and enhance cognitive functioning. Over recent decades, the growing availability of energy drinks has introduced new pathways for high-dose caffeine intake, particularly among young adults and university students.

Medical students are at heightened risk of consuming elevated quantities of caffeine owing to demanding academic schedules, prolonged study periods, inadequate sleep, and examination-related stress. Previous studies across multiple countries have documented caffeine usage prevalence ranging from 70% to 90% among medical students. While moderate consumption is generally considered harmless, excessive intake is associated with insomnia, anxiety, irritability, cardiovascular palpitations, gastrointestinal disturbances, and caffeine dependence. The growing accessibility of energy drinks has amplified concerns regarding risky consumer behaviours, particularly in the college and university setting.

Despite widespread caffeine consumption among medical students, relatively few studies have systematically explored consumption patterns, motivational factors, associated health hazards, and knowledge of safe intake recommendations specifically within this population. Such information is of particular significance given that medical students are

future healthcare professionals whose personal health behaviours may influence their clinical attitudes toward patient health education. This study sought to address these gaps by comprehensively investigating caffeine and energy drink consumption among undergraduate medical students at Osh State University.

II. MATERIALS AND METHODS

2.1 Study Design and Setting

This was a cross-sectional descriptive survey study conducted among undergraduate medical students to assess patterns of caffeine and energy drink consumption, behavioural correlates of caffeine intake, perceived influence on academic performance, adverse health outcomes, and knowledge regarding caffeine safety.

2.2 Study Population and Sampling

The study targeted undergraduate medical students from all academic years of the medical programme. Convenience sampling was employed by distributing an online questionnaire link via social media and email accounts. Voluntary participation was ensured; students who completed the questionnaire provided implicit informed consent. A total of 145 responses were received and analysed.

Inclusion criteria: Undergraduate medical students, aged above 17 years, providing informed consent and completing the questionnaire.

Exclusion criteria: Non-medical students, incomplete survey submissions, and students declining consent.

2.3 Study Instrument

A structured self-administered questionnaire was developed in Google Forms following a review of published literature on caffeine and energy drink consumption among university students. The instrument comprised four sections: (1) sociodemographic details (age, gender, academic year); (2) caffeine consumption patterns (frequency, source, timing, quantity, energy drink use); (3) motivations for caffeine intake and perceived academic effects; and (4) adverse effects, withdrawal symptoms, risky behaviours, and safety knowledge.

2.4 Data Collection and Analysis

The questionnaire link was shared electronically with eligible participants. Prior to participation, students were informed about the study objectives, voluntary nature, confidentiality, and anonymity of responses. Submission of the completed questionnaire served as evidence of consent. Data were transferred from Google Forms to Microsoft Excel for descriptive analysis. Categorical variables are presented as frequencies and percentages. Results are organised under thematic categories including demographic characteristics, consumption patterns, motivations, academic effects, adverse effects, and safety knowledge.

2.5 Ethical Considerations

Participation was entirely voluntary. Personal identifying data were not collected at any stage. All data were used exclusively for research purposes and maintained in strict confidence.

III. RESULTS

3.1 Demographic Characteristics and Caffeine Use Frequency

Of 145 participants, the predominant age group was 20–22 years (35.2%), followed by 26+ years (24.1%), 17–19 years (22.8%), and 23–25 years (17.9%). Females constituted 54.5% and males 45.5% of respondents. Students from all academic years participated, with first- and fourth-year students being most prevalent (25.5% each). Caffeine use frequency was heterogeneous: 22.1% reported daily use, 24.1% had never consumed caffeine, and 20.0% rarely used it. This pattern of heterogeneous use was consistent with similarly designed studies across Saudi Arabia, India, Pakistan, the United States, Egypt, Malaysia, Australia, China, Turkey, and the United Kingdom, where caffeine use among university students ranged from 60–90%.

Table 1. Demographic Characteristics and Caffeine Use Frequency (N = 145)

Variable	Category	n (%)
Age group	20–22 years	51 (35.2%)
	17–19 years	33 (22.8%)

Variable	Category	n (%)
	26+ years	35 (24.1%)
	23–25 years	26 (17.9%)
Gender	Female	79 (54.5%)
	Male	66 (45.5%)
Academic year	1st year	37 (25.5%)
	4th year	37 (25.5%)
Caffeine frequency	Daily users	32 (22.1%)
	Never	35 (24.1%)
	Rarely	29 (20.0%)

3.2 Caffeine Sources and Consumption Patterns

Energy drink consumption was nearly evenly split, with 72 consumers (49.7%) and 73 non-consumers (50.3%). The leading caffeine sources were coffee (25.5%), tea (20.7%), caffeine pills/supplements (20.7%), and energy drinks (20.0%). Peak consumption timing was during evening study sessions (28.3%) and morning hours (27.6%). Most students consumed one to four portions of caffeinated products daily, with four servings being the most frequently reported. The relatively high prevalence of caffeine supplement use distinguishes this cohort from some previously published studies, where supplement use is less common.

Table 2. Caffeine Sources and Consumption Patterns (N = 145)

Variable	Category	n (%)
Primary source	Coffee	37 (25.5%)
	Tea	30 (20.7%)
	Caffeine pills/supplements	30 (20.7%)
	Energy drinks	29 (20.0%)
Timing of consumption	Evening study	41 (28.3%)
	Morning hours	40 (27.6%)

Variable	Category	n (%)
Energy drink use	Users	72 (49.7%)
	Non-users	73 (50.3%)
Daily servings	4 servings (most prevalent)	—

3.3 Changes After Joining Medical School and Reasons for Consumption

Considerable changes in caffeine consumption were reported after joining medical school: 40 students indicated a slight increase and 35 reported a significant increase. The primary motivations for caffeine use were: staying awake (28.3%), habit (25.5%), taste preference (25.5%), and improving concentration (20.7%). More than half of all respondents reported increased intake during examination periods, with 32 strongly agreeing and 20 agreeing with this statement. These findings align with published evidence from India, Saudi Arabia, Pakistan, and the United States confirming academic stress as a principal driver of caffeine consumption among medical students.

Table 3. Changes in Caffeine Consumption and Reasons for Use (N = 145)

Variable	Category	Frequency (n)	Percentage (%)
Change in caffeine intake after entering medical school	Slight increase	40	—
	Significant increase	35	—
Primary reason for caffeine consumption	Staying awake	41	28.3
	Habit	37	25.5
	Taste	37	25.5
	Improving concentration	30	20.7
Increase in caffeine use during examinations	Strongly agree	32	—
	Agree	20	—

3.4 Adverse Effects, Dependence, and Safety Knowledge

Health-related adverse effects and dependence criteria were commonly observed. Anxiety

or jitteriness was the most prevalent side effect (n = 31), followed by insomnia (n = 28) and palpitations (n = 25). Withdrawal symptoms were frequent: 42 students experienced them often and 37 always. Awareness of the 400 mg/day safe caffeine threshold was present in 85 respondents (58.6%). Notwithstanding this awareness, 55 students frequently mixed energy drinks with other stimulants or alcohol, illustrating a notable knowledge-to-behaviour gap. Regarding academic effects, 40 respondents perceived that energy drink use negatively impacted their studies — a more prominent trend than positive academic perceptions.

Table 4. Adverse Effects and Dependence-Related Indicators (N = 145)

Indicator	Frequency (n)	Notes
Anxiety / Jitteriness	31	Most prevalent side effect
Insomnia	28	Second most common
Palpitations	25	Third most common
Withdrawal symptoms (often)	42	High dependence burden
Withdrawal symptoms (always)	37	—
Knowledge of 400 mg/day safe limit	85	Moderately high awareness
Frequent mixing with stimulants/alcohol	55	Knowledge–behavior gap
Negative academic perception (studies suffered)	40	Predominant perception

IV. DISCUSSION

This study provides a comprehensive characterisation of caffeine and energy drink consumption patterns among undergraduate medical students, with several clinically and educationally significant findings. The widespread and heterogeneous nature of caffeine use — ranging from non-consumers to daily heavy users — reflects the multifactorial determinants of consumption, including academic pressure, habitual behaviour, taste preference, and perceived cognitive enhancement.

Coffee emerged as the most common caffeine source, consistent with comparable studies conducted globally. However, the notably high prevalence of caffeine supplement use distinguishes this sample from some previously published reports, likely reflecting the

increased commercial availability and perceived convenience of concentrated caffeine products. This finding warrants particular attention, as supplements facilitate higher and less monitored caffeine intake relative to traditional beverages.

Academic stress was identified as a key determinant of caffeine consumption, with the majority of participants reporting increased intake since joining medical school and a substantial proportion acknowledging further escalation during examinations. This pattern aligns with research by Dyrbye et al. on academic pressure and student wellbeing, Abdulghani et al. on examination-related anxiety among medical undergraduates, and Almojali et al. linking sleep deprivation and academic pressure to elevated stress perception. The cyclical relationship between caffeine use and sleep impairment is well established: excessive caffeine intake produces insomnia, which in turn increases fatigue, which then drives further caffeine consumption.

The adverse effect profile documented in this study — anxiety/jitteriness, insomnia, palpitations, and prevalent withdrawal symptoms — confirms established pharmacological evidence on the sympathomimetic and CNS stimulatory effects of high-dose caffeine. The high frequency of withdrawal symptoms (reported by over half of respondents) is of particular clinical relevance, reflecting physiological dependence that may compromise academic functioning during caffeine-abstinent periods. The perceptions of academic benefit were mixed: while some students attributed improved alertness and concentration to caffeine, others reported neutral or negative academic effects, consistent with the dose-dependent and context-specific nature of caffeine's cognitive effects documented in the literature.

Perhaps most striking was the knowledge-to-behaviour gap: despite 58.6% of respondents being aware of the 400 mg/day safe intake threshold, a substantial proportion continued to engage in risky behaviours — particularly combining energy drinks with other stimulants or alcohol. This dissociation between knowledge and behaviour is a well-recognised phenomenon in health behaviour research and underscores the insufficiency of knowledge-based educational interventions alone. Structural and motivational strategies, including stress management programmes, sleep hygiene workshops, and regulated availability of

high-caffeine products within university environments, are likely required to produce meaningful behavioural change.

The findings of this study have several parallels with comparable investigations in India, Saudi Arabia, Pakistan, Egypt, Turkey, Malaysia, China, Australia, the United Kingdom, and the United States, where caffeine use motivations and adverse effects follow broadly similar patterns. The elevated supplement use and high prevalence of energy drink mixing in this cohort represent distinctive features that merit further longitudinal investigation.

V. CONCLUSION

Caffeine intake is highly prevalent among undergraduate medical students at Osh State University and is strongly associated with academic pressure, examination stress, and the need to maintain wakefulness. Coffee remains the dominant caffeine source, but energy drinks and caffeine supplements represent significant and growing contributors. The majority of participants reported increased caffeine use since joining medical school, confirming the impact of academic demands on health behaviour.

A substantial burden of caffeine-related adverse effects was documented, including anxiety, insomnia, cardiac palpitations, and withdrawal symptoms. Perceptions of caffeine's academic benefits were inconsistent, while negative academic influences were more frequently acknowledged. Although awareness of the recommended 400 mg/day limit was moderately high, risky behaviours such as combining energy drinks with stimulants or alcohol were prevalent, demonstrating a significant knowledge-behaviour gap.

These findings support the implementation of targeted interventions within medical university settings, including: (1) structured caffeine awareness and health education programmes; (2) stress management and sleep hygiene workshops; (3) institutional regulation of energy drink availability; (4) longitudinal surveillance of long-term caffeine use outcomes; and (5) evidence-based interventions addressing dependence-related behaviours. Medical universities have a particular responsibility to model and promote healthful behaviours among students who will become future healthcare professionals and role models for their patients.

REFERENCES

[1] L. M. Juliano and R. R. Griffiths, "A critical review of caffeine withdrawal: empirical validation of symptoms and signs, incidence, severity, and associated features," Psychopharmacology (Berl), vol. 176, no. 1, pp. 1–29,

2004.

[2] C. R. Mahoney et al., "Intake of caffeine from all sources and reasons for use by college students," Clin. Nutr., vol. 38, no. 2, pp. 668–675, 2019.

[3] B. M. Malinauskas et al., "A survey of energy drink consumption patterns among college students," Nutr. J., vol. 6, p. 35, 2007.

[4] M. L. Pettit and K. A. DeBarr, "Perceived stress, energy drink consumption, and academic performance among college students," J. Am. Coll. Health, vol. 59, no. 5, pp. 335–341, 2011.

[5] G. S. Trapp et al., "Energy drink consumption among young Australian adults: associations with alcohol and caffeine intake," Public Health Nutr., vol. 17, no. 7, pp. 1540–1547, 2014.

[6] A. M. Arria et al., "Energy drink consumption and increased risk for alcohol dependence," Alcohol Clin. Exp. Res., vol. 35, no. 2, pp. 365–375, 2011.

[7] S. M. Seifert et al., "Health effects of energy drinks on children, adolescents, and young adults," Pediatrics, vol. 127, no. 3, pp. 511–528, 2011.

[8] G. Richards and A. P. Smith, "Caffeine consumption and self-assessed stress, anxiety, and depression in secondary school children," J. Psychopharmacol., vol. 29, no. 12, pp. 1236–1247, 2015.

[9] F. O'Callaghan, O. Muurlink, and N. Reid, "Effects of caffeine on sleep quality and daytime functioning," Risk Manag. Healthc. Policy, vol. 11, pp. 263–271, 2018.

[10] S. Attila and B. Çakir, "Energy-drink consumption in college students and associated factors," Nutrition, vol. 27, no. 3, pp. 316–322, 2011.

[11] M. S. Mahfouz et al., "Energy drink consumption among university students in Saudi Arabia," J. Family Community Med., vol. 21, no. 2, pp. 111–116, 2014.

[12] A. A. Alrasheedi, "Prevalence and reasons for energy drink consumption among medical students in Saudi Arabia," Saudi Med. J., vol. 37, no. 12, pp. 1359–1364, 2016.

[13] M. Ahmed et al., "Patterns of caffeine consumption and associated factors among medical students," J. Egypt Public Health Assoc., vol. 94, no. 1, pp. 12–18, 2019.

[14] Y. Liu et al., "Caffeine intake and sleep quality among Chinese medical students," BMC Public Health, vol. 20, p. 1234, 2020.

[15] M. Shafiq et al., "Caffeine consumption and academic performance among medical students in Pakistan," Pak. J. Med. Sci., vol. 34, no. 5, pp. 1213–1218, 2018.

[16] S. Kumar et al., "Prevalence and determinants of caffeine consumption among medical students in India," Int. J. Community Med. Public Health, vol. 7, no. 9, pp. 3515–3521, 2020.