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Caffeine Usage among Medical Students and Their Knowledge of Its Benefits and Side Effects

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Abstract

Caffeine, known for its stimulating effects, is widely consumed by medical students to counteract stress, fatigue, and enhance alertness for academic performance. This study aimed to assess the prevalence, types, and motivations for caffeine consumption among medical students, as well as their knowledge of its benefits and potential side effects. A cross-sectional online survey was conducted among first- to sixth-year medical students at Al-Iraqia University and Al- Mustansiriyah University. Data were collected via Google Forms, distributed through academic online platforms from Jan 23 to 30th, 2024, to investigate caffeine consumption patterns and general knowledge.

A total of 507 students participated, with 471 (93%) reporting caffeine consumption. The Majority were female (67.1%). The most commonly consumed caffeine product was Coffee (60.4%), followed by tea (56.2%). Daily caffeine consumption was reported by 61.3% of students, with most consuming 1-3 cups per day, while a minority (7%) consumed more than three cups. The primary reason for caffeine intake was to stay awake (60.6%). Additionally, 66.3% of students reported an increase in caffeine consumption upon entering medical school. While students exhibited limited general knowledge about caffeine, they demonstrated better awareness regarding side effects and withdrawal symptoms.

A significant proportion of medical students consume caffeine, predominantly in the form of Coffee, with increased intake observed during examination periods. Although consumption levels were generally within safe limits, the findings highlight the need for greater awareness regarding the long-term effects of excessive caffeine consumption.

Keywords

Caffeine consumption, medical students, academic performance, side effects, withdrawal symptoms.

Research Article

Introduction

Caffeine is a central nervous system stimulant belonging to the xanthine group (1). It is the most widely used psychoactive substance in human history, with over 80% of the global population consuming it regularly (3). The primary sources of caffeine intake include Coffee, tea, carbonated soft drinks, and energy drinks, while chocolates, certain non-beverage foods, and pharmaceuticals also contribute to caffeine consumption (5).

Research has shown that habitual caffeine consumption is positively correlated with improved verbal memory, cognitive function, and reaction time. Regular caffeine intake has been associated with enhanced alertness, better performance on vigilance tasks, increased attention span, improved long-term memory, and faster locomotor speed, explaining its widespread use (4).

Although caffeine is generally considered safe, its effects on health are dose-dependent, and excessive consumption can lead to adverse health outcomes (6). High caffeine intake (1000–1500 mg per day) can result in caffeine's, a condition characterized by restlessness, agitation, excitement, incoherent speech, and insomnia. Caffeine's is often overlooked in psychiatric assessments due to its symptom overlap with various psychiatric disorders (4).

Caffeine consumption is especially prevalent among medical students, who often prefer caffeine over other psychoactive substances. The competitive nature and demanding workload in medical education contribute to increased caffeine intake to enhance alertness, concentration, and stamina. Numerous studies indicate that a significant percentage of medical students rely on daily caffeine consumption to cope with stress and academic pressure (7).

Given the serious health implications of excessive caffeine intake, it is crucial to understand the reasons and patterns of consumption among medical students. Identifying these factors will aid in developing strategies to regulate caffeine use and promote healthier alternatives (2).

The study aims to determine the prevalence, types, and reasons for caffeine consumption and to assess knowledge regarding caffeine intake among medical students.

Materials &Methods

Study Design and Participants

A cross-sectional online survey was conducted among first- to sixth-year medical students from Al-Iraqia University and Al-Mustansiriyah University, College of Medicine, during the 2023–2024 academic year. Data collection took place from Jan 23 to 30th, 2024.

Study Tool and Data Collection

Data were collected using a Google Forms structured questionnaire developed after reviewing relevant studies on caffeine consumption. The questionnaire was

electronically disseminated via academic online groups, ensuring targeted distribution according to the student's academic year.

The questionnaire consisted of three sections:

1. Demographic Information:
    a. Academic year
    b. Gender
2. Caffeine Consumption Patterns:
    a. Types of caffeinated beverages consumed
    b. Preferred form of caffeine
    c. Frequency and timing of caffeine intake
    d. Reasons for caffeine consumption
    e. Changes in caffeine consumption after entering medical school and during exams
    f. Self-assessment of caffeine addiction
3. Knowledge Assessment:
    a. 24 statements evaluating students' knowledge of caffeine benefits, side effects, and withdrawal symptoms

Ethical Approval

Ethical approval was obtained from Al-Iraqia University, College of Medicine. To ensure participant anonymity and confidentiality, the questionnaire did not require names or personal identifiers, and all collected data were kept confidential.

Data Analysis

Data entry and analysis were performed using Microsoft Excel. Findings were presented in the form of frequencies and percentages, illustrated through tables and figures for clarity.

A total of 507 medical students participated in the study. The distribution of participants by academic year and gender is presented in Tables 1 and 2.

• ***Gender Distribution:***

- Female students constituted the Majority of the sample, accounting for 67.1% of the participants.
- Male students comprised 32.9% of the study population.

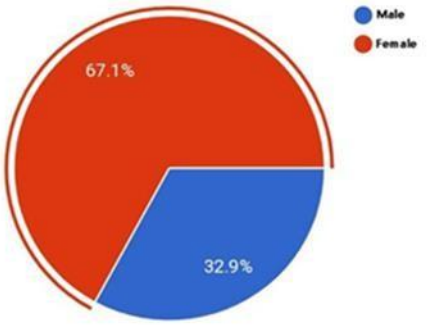
Further analysis of caffeine consumption patterns, preferences, and knowledge levels among participants is detailed in subsequent sections.

Table 1. The distribution of study group according to grade (n=507)

Grade	No.	%
First stage	12	2.4
Second stage	73	14.4
Third stage	53	10.5
Fourth stage	339	66.9
Fifth stage	13	2.6
Sixth stage	17	3.4
Total	507	100

Table 2. The distribution of study group according to gender.

Gander	No.	%
Male	167	32.9
Female	340	67.1
Total	507	100



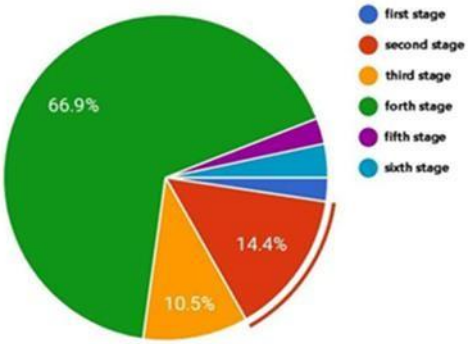


Table 3 display the type of caffeine products is consumed by students Coffee was the most common 60.1 % (no=309), followed by tea consumed by student 56.8 % (no=292). The results in figure 1 show that 311 (61.3%) of students consume caffeine daily, 71 (14%) consume it during exam period only.

The results in figure 2 show that 289 (57%) of students consume 1-3 cup daily, with a minority of students who consume more than 4, 174 (34.3%) of students don't consume it daily.

Table 3. The caffeine products consumed by students

Caffeine products	No.	%
Coffee and its derivative	309	60.1
Tea	292	56.8
Energy drinks	60	11.7
Soft drinks	109	21.2
Others	36	7

Figure 1

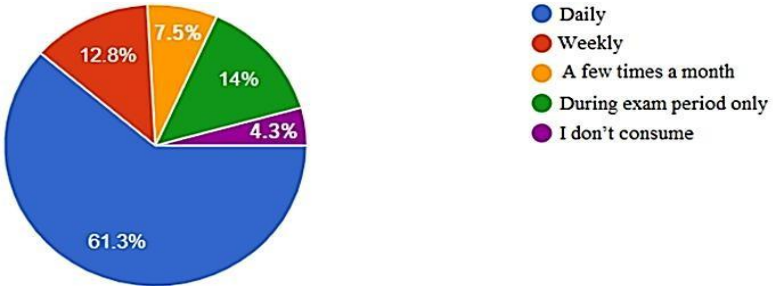


Figure 3 shows that 47% of students consume caffeine at varying times, while 23.9 % consume caffeine in the morning.

Figure 4, we noticed an increase in students' caffeine consume after entering medical school by 66.3%.

In figure 5, we noticed a significant increase in caffeine consumption during the exam period in the rate of 75.1%.

Figure 6 demonstrates that 61% of surveyed students indicate that they are capable of abstaining from caffeine.

Figure 7 demonstrates that 69.8% of students don't consider themselves as a caffeine addicted, while the other 30.2% of students do. The reasons for in caffeine consumption listed in table 4. "To stay awake" was the top most reason mentioned by 307 (60.6%) of caffeine consumer students.

Table -5 demonstrates the knowledge of the participating students about the benefits,

effects and withdrawal symptoms of caffeine. Concerning the benefits of caffeine,

the Majority of the students enrolled in the study correctly identified the role of caffeine in increase attention and enhancing general performance. It is noteworthy that only 20.7% of study participants had correct knowledge that caffeine prevents type 2 DM.

When the side effects of caffeine were determined, Majority of students correctly identified the common side effects of caffeine consumption, while a minority correctly identified the unusual symptoms. Furthermore, most of the participants were able to recognize that fatigue and drowsiness among the withdrawal symptoms of caffeine.

Table 4. The reasons for in caffeine consumption

Reasons	No.	%
To Stay Awake	307	60.6
To enhance concentration	262	51.7
To relieve a headache	174	34.3
To increase study hours	222	43.8
To memorize information faster	35	6.9
Because I like its taste and enjoy drinking it.	229	45.2
To control weight	12	2.4
Gathering with friend	80	15.8
Other	25	4.9

Table 5. Students' knowledge of the benefits, side effects and withdrawal symptoms of caffeine.

Benefits	No.	%
Increase alertness	262	51.7%
Increase mental and physical performance	249	49.1%
Enhance general performance	332	65.5%
Substitute for sleep	40	7.9%
Protect against Parkinson's disease and type 2 DM	105	20.7%
Side effects	No.	%
Fatigue	105	20.7%
Fast heart rate	231	45.6%
Headache	61	12%
Stomachache	85	16.8%
Rambling speech	36	7.1%
Tremor	139	27.4%
Anxiety	105	20.7%
Sleep disturbances	164	32.3%
Weight loss	1	0.2%
Sweating	1	0.2%
None	157	31%

Withdrawal symptoms	No.	%
Fatigue	164	32.3%
Drowsiness	108	21.3%
Depression	65	12.8
Anxiety	40	7.9%
Vomiting	7	1.4%
Difficulty concentrating	118	23.3%
Strong desire to consume caffeine	104	20.5%
Constipation	17	3.4%
Headache	2	0.4%
None	247	48.7%

Figure 2

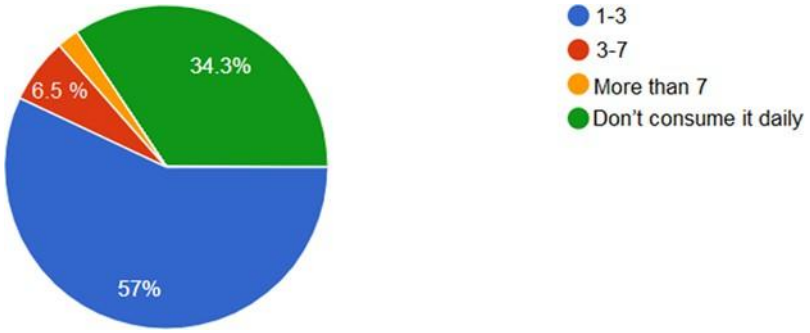
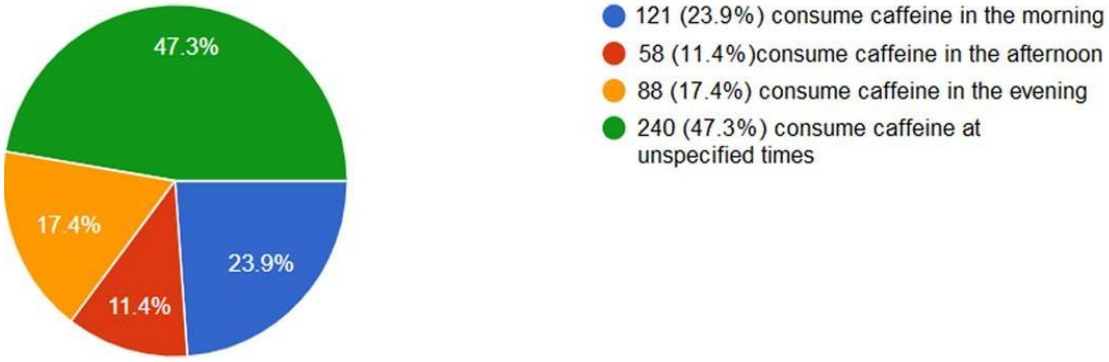


Figure 3



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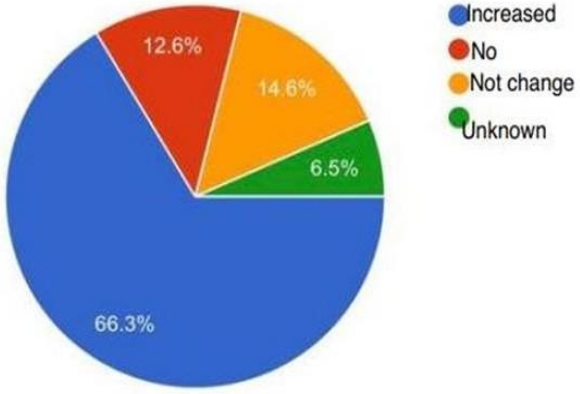


Figure 5

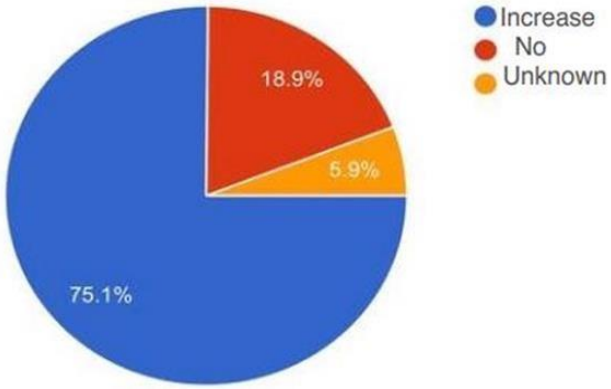


Figure 6

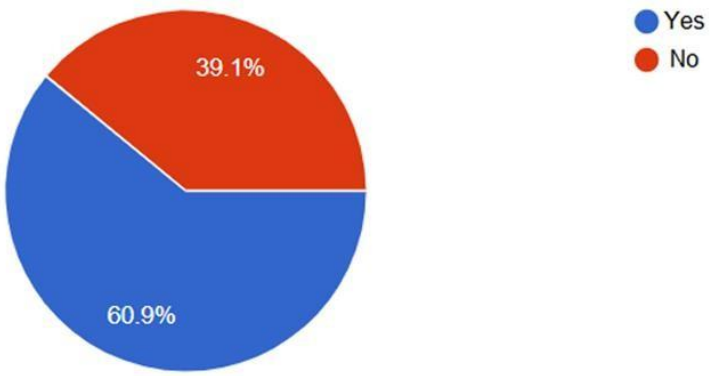
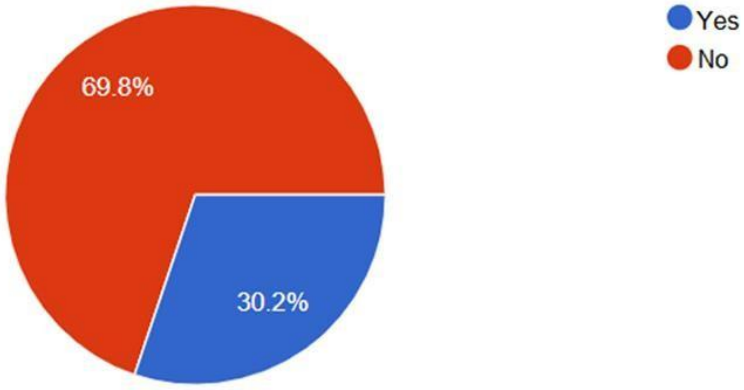


Figure 7



Discussion

The consumption of caffeinated beverages continues to rise across various age groups due to their easy availability, widespread appeal, and stimulating effects. These beverages are widely consumed, even among younger individuals, particularly medical students. The findings of this study indicate a high prevalence of

caffeine consumption among students in the second, third, and fourth years of medical school, likely due to the increasing academic demands in these stages, where students strive to build a strong foundation in medicine. Medical students face intensive coursework, clinical sessions, and lectures, necessitating sustained alertness and engagement, which may contribute to their increased reliance on caffeine for an energy boost (2). The study found that fourth-year students had the highest caffeine consumption rates, which can be attributed to the greater intensity of their academic workload, extended study hours, and clinical rotations compared to students in other years. This trend aligns with findings from previous research, which observed a higher caffeine intake among students in more advanced years of medical education (8, 9, and 10).

Regarding beverage preferences, Coffee was the most consumed caffeinated

product, followed by tea, consistent with research conducted in Malaysia (8) and Pakistan (9, 10). The preference for coffee and tea may be influenced by cultural factors such as accessibility and affordability. Additionally, it was uncommon for students to consume only one type of caffeinated product, as seen in prior studies in Jordan (5) and Saudi Arabia (11). More than 57% of caffeine users in this study reported consuming caffeine 1–3 times per day, consistent with findings from Jordan and Pakistan (5, 12). Stress and workload significantly influenced caffeine intake among students. Upon entering medical school, 66.2% of students reported an increase in caffeine consumption, which aligns with research conducted in the UAE and Pakistan (13). The demanding academic curriculum, frequent examinations, and pressure to excel in medical school contribute to increased caffeine consumption as a coping mechanism for stress and sleepless nights (14).

The primary reason for caffeine intake among students in this study was to stay awake and improve alertness (60.6%), a finding consistent with previous studies in Malaysia (8) and Saudi Arabia (14). Caffeine blocks adenosine receptors, preventing the onset of sleepiness while also stimulating the release of epinephrine, norepinephrine, and dopamine, further enhancing its alertness-boosting effects. Additionally, some students substituted caffeine for sleep, which may contribute to long-term dependence and withdrawal symptoms (15).

Exam periods were associated with increased caffeine intake, with 75.1% of students consuming more caffeine during exams and 49% believing it enhances their academic performance. Similar trends have been reported in prior research, where medical students increased caffeine consumption during study periods in preparation for examinations (16). The correlation between caffeine intake and exam performance is likely due to caffeine's role in enhancing concentration and sustained cognitive function, both of which are crucial for medical students (15, 16).

In terms of knowledge and awareness, the majority of students correctly identified caffeine's effects on performance, alertness, and attention, which may be attributed to medical education and exposure to scientific information. However, only 20% of students were aware that caffeine may help prevent conditions such as Parkinson's disease, Alzheimer's disease, and Type 2 diabetes mellitus. This knowledge gap suggests an insufficient understanding of caffeine's potential benefits (17).

Conversely, students exhibited greater awareness regarding the side effects and withdrawal symptoms associated with caffeine consumption. This higher awareness may stem from their personal experiences with caffeine-related side effects, leading to a more practical understanding of these risks. Similar findings were reported in previous studies, highlighting that students tend to be more familiar with the negative effects of caffeine rather than its potential health benefits.

Conclusion

The findings of this study highlight the widespread use of caffeine among medical students, particularly for its alertness-enhancing effects and as a coping mechanism during exams and high-stress periods. While students demonstrated adequate awareness of caffeine's effects on performance and withdrawal symptoms, knowledge gaps exist regarding its long-term health benefits. Given the high reliance on caffeine, awareness campaigns and educational interventions may be necessary to promote safe caffeine consumption habits among medical students.

Recommendations

To promote healthier caffeine consumption habits among medical students, the following measures are recommended:

1. Health Awareness Programs: Organize seminars and workshops to educate students on the safe use, benefits, and risks of caffeine.
2. Informational Campaigns: Distribute posters, brochures, and digital materials within university premises to provide evidence-based guidance on caffeine consumption.
3. Consumption Monitoring: Encourage self-assessment tools and provide consultation services to help students regulate caffeine intake.
4. Stress Management Strategies: Promote adequate sleep, exercise, and mindfulness techniques as healthier alternatives to excessive caffeine reliance.

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