

Caffeine consumption and perceptions of medical students; A cross sectional study

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ABSTRACT

Objective

This study aimed to identify the relationships between caffeine consumption and perceptions of medical students.

Methodology

This is a cross sectional study, conducted from June to August 2019 at Shifa College of Medicine, Shifa Tameer-e-Millat University, Islamabad, Pakistan. Participants completed a questionnaire that assesses patterns of caffeine consumption, perceived benefits and adverse effects. Spearman correlation was used to identify their relationships. This study is reported in adherence to STROBE reporting guidelines.

Results

A total of 101 participants completed the questionnaire, where 77.2% reported to consume caffeine. Results showed significant associations between caffeine consumption and self-reported addiction ($\rho=0.329$, $p=0.001$), perceived adverse effects including weight gain ($\rho=0.262$, $p=0.008$), palpitations ($\rho=0.210$, $p=0.035$), and perceived benefits such as improved academic performance ($r=0.334$, $p=0.001$), increased recalling ($\rho=0.283$, $p=0.004$) and reading power ($\rho=0.359$, $p=0.000$). Caffeine consumption was also associated with self-reported academic load or stress ($\rho=0.491$, $p=0.000$).

Conclusion

Although the majority of medical students were aware of the harmful effects of caffeine consumption, most of them were consuming caffeine. More awareness is required to increase the awareness among medical students.

Key words: Caffeine, Medical students, addiction, stress, awareness, diet

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INTRODUCTION

Caffeine is one of the leading dietary components consumed by all age groups.^{1,2} It is found in many common natural food sources such as tea and coffee, Caffeine is also added synthetically to solid foods and beverages due to its stimulatory effects.³⁻⁶ The source or the form in which caffeine is consumed determine its effects on human body.⁷ The positive and negative effects of caffeine have been documented but only a few studies have identified factors influencing caffeine consumption. For instance, a genome-wide meta-analysis has identified specific genes which determine habitual caffeine consumption.⁸

Caffeine has been associated with tachycardia, vomiting and cardiac arrhythmias. Excessive consumption has been correlated with withdrawal symptoms, insomnia and anxiety.^{9,10} In contrast, an umbrella review reported that caffeine consumption in the form of 3 to 4 cups of coffee per day is associated with large risk

reduction of several cardiovascular disorders and cancers.¹¹ These studies indicate that the positive and negative effects might be related to the amount of caffeine being consumed. The U.S. Food and Drug Administration reported that consuming 400mg of caffeine per day is not associated with any negative effects for a healthy adults,¹² which is also supported by other studies.^{13,14} According to a Study by Khadem Al et.al, Consumption of caffeine, like tea, energy drinks, and coffee among medical students are common, although most medical students are aware of the negative effects, including poor sleep quality and loss of focus.¹⁵⁻¹⁸ As medical students often have high consumption of caffeinated products, they were prone to have poor sleep quality.¹⁶ It shows that medical students, especially in their earlier academic years, need better awareness about nutritional intake. However, factors influencing the amount of caffeine consumption among medical

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students of our society are still unclear. This study, therefore, aimed to examine the frequency and amount of caffeine consumption among undergraduate medical students and to assess their knowledge, perceived benefits and adverse effects of caffeine consumption.

METHODOLOGY

This cross-sectional study was carried out on second-year undergraduate medical students at Shifa College of Medicine, Shifa Tameer-e-Millat University, Islamabad, Pakistan. This study was approved by the Institutional Review Board and Ethics committee (IRB&EC)(Reference IRB number: 184-674-2019). Informed consent was obtained from all participants. The study was conducted from 10th June to 15th August 2019. A total of 101 students were recruited through convenient sampling and they completed a self-administered semi-structured questionnaire.¹⁹ Participants were inquired about their demographic details, perception about caffeine and its usage in their daily life. In order to assess caffeine consumption, participants were asked “how often do you consume caffeine per day” and “how much do you consume per serving”. Total amount of caffeine consumption per day was assessed by multiplication of the above variables. Perceived benefits and harmful effects were assessed based on a binary scale (Yes/No).

Caffeine consumption and its associated factors were presented as frequency, percentages, mean and standard deviation. Spearman correlation was used to identify associations between consumption of caffeine and various variables. Significance level was set at $p < 0.05$. All statistical analyses were carried out using SPSS version 26 (IBM Corp, Armonk, NY, USA).

RESULTS

Among the 101 participants, the majority were males (51.5%). The age of the participants varied over a range of 18-23, with the mean age 20.25 ± 0.98 years. The demographic information regarding caffeine consumption of participants is presented in Table 1.

About 77% participants reported that they have consumed caffeine in any form. Only 8 (7.9%) participants were consuming it more than three times per day, whilst 43 (42.6%) participants were consuming it only once per day. The amount of caffeine being consumed was split into a range of four options, only 2 (2%) were consuming more than 400mg of caffeine per day, while 53 (52.5%) participants were consuming about 20-200mg of caffeine per day (One sachet of coffee = roughly 50-100 mg of caffeine). About 65% participants were aware that caffeine consumption is harmful to their health (Table 1).

The use of tea as a source of caffeine was the most common among 72 (71.3%) participants, followed by chocolate, soft drinks and coffee (Fig 1).

A total of 29 participants (28.7%) reported being addicted to caffeine, only 7 participants (6.9%), however, agreed that they were able to withdraw from caffeine. A total of 36 participants (35.6%) acknowledged using caffeine for academic load or stress (Table 2).

Variables	Number (n)	Proportion
Gender		
Male	52	51.5%
Female	49	48.5%
Mean Age (years)	20.25± 0.98	
Caffeine consumption in any form		
Yes	78	77.2%
No	23	22.8%
How often do you consume caffeine per day		
Never/ Rarely		
Once	26	25.7%
Twice	43	42.6%
Thrice or more	24	23.8%
	8	7.9%
How much caffeine do you consume each time/ per serving		
Not at all(not including rare instances)	24	23.7%
A little (20-200mg)	53	52.5%
Moderate (200-400mg)	22	21.8%
A lot (more than 400mg)	2	2%
Caffeine harms health		
Yes	66	65.3%
No	35	34.7%

Table 1 Demographics and details regarding caffeine consumption in medical students (n=101)

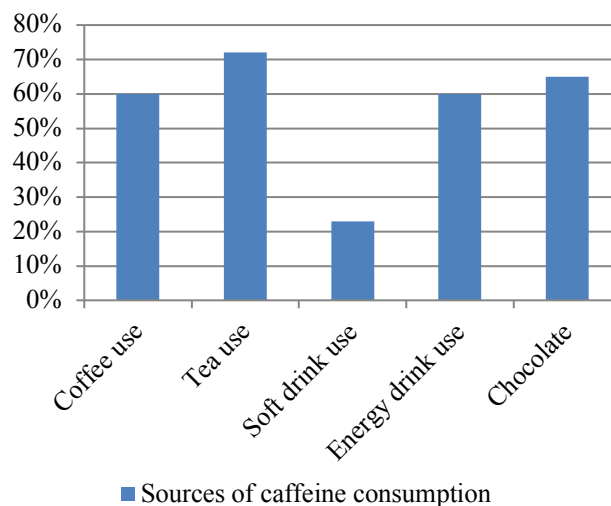


Figure 1. Self-reported sources of caffeine consumption (n=72)

Amount of caffeine consumption was significantly correlated with self-reported addiction and academic load or stress, perceived negative effects including weight gain, palpitations, and perceived positive effects including improved academic performance, increased recalling and reading power (Table 2).

	Variables	Yes n(%)	No n(%)	Correlations with the amount of caffeine consumption	
				Spearman rho	p-value
	Addiction to caffeine*	29(28.7%)	72(71.3%)	0.329	0.001*
	Ability to withdraw from caffeine	7(6.9%)	94(93.1%)	-0.117	0.242
	Caffeine consumption for academic load or stress*	36(35.6%)	65(64.4%)	0.491	0.000*
Perceived negative effects					
1.	Weight gain*	7(6.9%)	94(93.1%)	0.262	0.008*
2.	Palpitations*	33(32.7%)	68(67.3%)	0.210	0.035*
3.	Stress	16(15.8%)	85(84.2%)	0.060	0.553
4.	Agitation	15(14.9%)	86(85.1%)	0.048	0.631
5.	Drunkenness	21(20.8%)	80(79.2%)	-0.114	0.256
6.	Fatigue	26(25.7%)	75(74.3%)	-0.077	0.444
Perceived positive effects					
1.	Improved academic performance*	44(43.6%)	57(56.4%)	0.334	0.001*
2.	Q improvement	10(9.9%)	91(90.1%)	0.077	0.447
3.	Increased self confidence	17(16.8%)	84(83.2%)	0.189	0.058
4.	Increased recalling power*	31(30.7%)	70(69.3%)	0.283	0.004*
5.	Increased reading power*	38(37.6%)	63(62.4%)	0.359	0.000*
6.	Increased study hours	70(69.3%)	31(30.7%)	0.138	0.168

Table 2. Perception about caffeine consumption and perceived negative and positive effects with significance at p -value=0.05

DISCUSSION

This study found that caffeine usage is common among second-year medical students, although they were aware of the adverse effects of caffeine. The majority of students were not addicted to caffeine but in those who were addicted, caffeine consumption was significantly more. Caffeine consumption was associated with perceived benefits like improved academic performance, reading power, recalling power and negative effects like weight gain and palpitations. A study conducted on medical students in Lebanon had similar results regarding the awareness of side effects of caffeine consumption but reported addiction to caffeine to be more common than suggested by this study.²⁰

In this study the majority of students consumed caffeine only once daily in a very little amount of around 20-200mg. The recommendation provided by U.S. Food and Drug Administration (FDA) and previous studies suggest that consumption of less than 400mg might bear benefits in some cases.^{1,3,7,13} The amount of caffeine consumption of medical students in this study was somewhat within the recommendation. Several sources of caffeine reported in this study were tea, chocolate, soft drink, coffee, and energy drinks having prevalence of around 71.3%, 64.4%, 62.4%, 59.4%, and 19.8% respectively. In previous studies, different sources of caffeine consumption were reported in

different age groups.^{2,5,6,9} Some of which reported coffee products and tea as the major sources, while soft drinks are a major source among the growing age group and how that trend shifts when they approach the 19-22 age group,^{21,22} which were in coherence with our study.

A similar study conducted in Ghana reported that lack of coffee intake may be associated with weight gain.²³ Our results, however, showed that caffeine consumption was associated with perceived weight gain. Studies conducted on cardiovascular health and various symptoms like palpitations, tremors, and insomnia suggested that caffeine intake in recommended dosage was associated with beneficial effects for normal cardiovascular function but intake of high amounts made the user more prone to palpitations and other symptoms.^{24,25} Similarly, positive association was drawn with respect to palpitations in our study. Previously a study reported that students were inclined more towards caffeine consumption in comparison to prescription of stimulants in order to improve their academic performance, with 41.4% and 23.6% of them consuming coffee and energy drinks.²⁷ In our study, using caffeine for academic load or stress was reported and the perceived benefits, including improved academic performance, increased recalling power and increased reading power, were associated with the amount of caffeine

consumption. The results were in accordance to previous studies.²³⁻²⁷

This study adopted a convenient sampling and it was conducted in a single medical school, the results therefore cannot be generalized. Moreover, self-reported data are subjected to recall bias, and the causal relationship cannot be drawn due to cross-sectional design.

CONCLUSION

The majority of medical students were consuming caffeine but was found not to be addicted to it. The amount of caffeine consumption was associated with perceived benefits and adverse effects, indicating that more awareness is required to increase the health awareness among medical students.

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