



## Caffeine Consumption & Perception of Its Effects Amongst University Students

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### ABSTRACT

**Introduction:** A variety of research studies have shown that caffeine usage is highly prevalent among university students and many of them have different perception of its effect on their mental and physical health. These perceptions can influence the intake of caffeine which may lead to its addiction, resulting in serious public health consequences. **Aims & Objectives:** The objective of the study is to determine the frequency of caffeine consumption and the perception of its effects among university students. **Place and duration of study:** This study was conducted within 6 months duration, from May 2018 to October 2019 among students of three private universities in Lahore, Pakistan. **Material & Methods:** This was a descriptive cross-sectional study. A sample size of 670 university students was taken and the data were collected from three private universities of Lahore through convenience sampling technique. The perception of effects of caffeine was determined through a pre-validated questionnaire, Caffeine Expectancy Questionnaire (CaffEQ) from consumers and nonconsumers of caffeine. **Results:** A total of 670 university students participated in the study, out of which, 278 (41.5%) were males and 392 (58.5%) were females. 506 (75.5%) participants were consumer of caffeine, while 164 (24.5%) were non consumer. The occurrence of caffeine consumption was more in males (79.9%) than in females (72.4%). Participants reported that they consume caffeine because it makes them feel more alert (83.4%), they experience caffeine withdrawal without caffeine (83%) and caffeine makes them feel more energetic (80.6%). The perceptions due to which participants don't consume caffeine were that they expect caffeine makes their heartbeat irregular (81.7%), they don't like the way caffeine makes them feel (80.5%) and caffeine makes them irritable (76.8%). **Conclusion:** The study concludes that male students had more tendencies towards caffeine consumption than females. Perceptions for consuming caffeine were feeling of alertness, experiencing caffeine withdrawal symptoms, feeling of energy and ability to work over long periods of time after having caffeine. The perceptions for not consuming caffeine were irregular heartbeat, bad feelings, irritability, and sleep disturbances.

**Key words:** Caffeine, perception, caffeine consumption, university students

### INTRODUCTION

Caffeine is believed to be the most widely used psychoactive substance globally and easily accessible in Pakistani society.<sup>1</sup> It is commonly used as an additive in drinks manufactured for weight reduction, sports enhancement and medications.<sup>2</sup> Caffeine is the constituent of variety of food sources including tea, coffee, drinks and chocolates. The amount ranges from 40 to 180 mg/150 ml for coffee, 24 to 50 mg/150 ml for tea, 15 to 29 mg/180 ml for cola, 2 to 7 mg/150 ml for cocoa, and 1 to 36 mg/28g for chocolate.<sup>3</sup> The common use of the

caffeinated products is considered to be connected with the food related social behaviors, individual habits and hereditary traits.<sup>4</sup> Although the moderate use, 400 mg/day is considered safe but children especially girls in the reproductive age are at higher risk of adverse issues due to the altering quantity of caffeine intake.<sup>3</sup>

The consumption of caffeine among youth is remarkably high worldwide and variety of caffeinated products are easily available.<sup>5</sup> The regular use of caffeine has been reported among 92% of college students in United States.<sup>6</sup> Another study conducted among Dutch university students concluded that 87.8% participants ingested caffeine

products during the last 24 hours.<sup>7</sup> The consumption of caffeine products among Canadian youth adults was found to be 73.6%. Similarly, high (94%) proportion of university students in Pakistan consumes caffeinated products.<sup>8</sup> The intake of caffeine reported is 97% in India and 98.5% in United Arab Emirates.<sup>9,10</sup>

The literature describes multiple positive and negative factors related with regular caffeine exposure. Caffeine may enhance multiple cognitive and behavioral processes which are associated with effective sports, exercise and cognitive performance like concentration, energy levels, and feelings of fatigue. The moderate intake of caffeine may enhance alertness, decrease tiredness and reduces the risk of certain diseases.<sup>11</sup> On the other hand, the negative effects of caffeine consumption include hunger suppression, mood swings, sleep problems and anxiety.<sup>12</sup> The abrupt withdrawal in chronic caffeine users may lead to severe headache, muscle pain, stiffness, vomiting and nausea.<sup>13</sup> The excessive consumption of caffeine is associated with multiple health related adverse effects like cardiovascular problems, decrease in bone density and calcium deposition.<sup>4,8,9,14,15</sup>

Caffeine is also used as an analgesic due to its pain relieving effects.<sup>16</sup> Although it reduces fatigue, but the excessive quantity may lead to intoxication and result in insomnia, anxiety and restlessness. The above mentioned health concerns are challenging after consumption of pharmacologically active caffeine. However, the psychological variations such as determination, motivation, mood states and beliefs are associated with perception of oral caffeine consumption

The use of caffeine in youngsters especially students in the form of coffee, tea, energy drinks and chocolates is an established phenomenon. The excessive intake may lead to addiction, resulting in serious public health consequences. Based on the review of the literature, a gap was detected regarding caffeine consumption and its perception among university students.<sup>17</sup> This study aims to determine the frequency of caffeine consumption and the perception of its effects among university students. The findings will help to overcome the issue through awareness, educational programs and also improve the quality of life of university students.

## **MATERIAL AND METHODS**

A descriptive cross-sectional study was conducted during a period of six months, from May 2018 to October 2019 after taking approval from the Ethical Review Board of Azra Naheed Medical College. The data was collected from the students of three private universities of Lahore, Pakistan. The sample size was calculated by taking  $Z_{1-\alpha/2} = 1.96$  (Standard normal variate at 5% type I error),  $P = 0.68$  (Expected proportion in population) and  $d = 0.05$  (absolute error).<sup>8</sup> The required sample was 335, however to improve the power and accuracy of study, it was increased to 670. Non-probability convenience sampling technique was adopted and three private universities in Lahore were selected. Students were approached in common areas of universities including cafeterias, grounds, mosques etc. Students of age group 18-25 years (both male and female) were included in the study. Drug addicts and pregnant female students were excluded. The perception of effects of caffeine was determined through a pre-validated questionnaire, Caffeine Expectancy Questionnaire (CaffEQ) from consumers and nonconsumers of caffeine.<sup>18</sup> A written Informed consent was taken from 698 students, out of which 21 refused to take part in the study and seven were not fulfilling the inclusion criteria. A total of 670 students filled the questionnaire. The questionnaire comprises of 7 factors, out of which 5 factors were describing perception that led to consumption, and 2 factors were describing perception that led to nonconsumption of caffeine. Consumers and nonconsumers were asked about the perception for consuming and not consuming the caffeine respectively. These seven factors include 47 questions, each of which was individually validated in a previous study. The validity of individual questions ranges from 0.36-0.98 and reliability of questionnaire ranges from 0.80 to 0.94.<sup>18</sup> The data was analyzed through SPSS version 24. The data was analyzed by using the Chi-square test and a p-value of  $\leq 0.05$  was considered as significant.

### **Statistical analysis:**

Data was entered and analyzed by using SPSS 24. The quantitative variables e.g. age were presented as Mean  $\pm$  S.D. The qualitative variables e.g. gender and perception of effects of caffeine was presented as frequencies and percentages.

## **RESULTS**

There were 670 study participants with a mean age of  $21.64 \pm 1.91$  SD (range = 18 to 25 years). Out of

the total subjects, 278 (41.5%) were males and 392 (58.5%) were females, 506 (75.5%) participants were consumer of caffeine, while 164 (24.5%) were non consumers. Caffeine consumption was more in males (79.9%) than in females (72.4%). The *p* value (0.03) calculated through chi square test showed that gender was associated with caffeine intake and caffeine consumption among males was significantly higher than females. The most common form of caffeine intake was tea (54.1%) followed by coffee (22.9%), chocolates (13.4%) and energy drinks (9.5%) respectively. (Table-1) Perception of effects of caffeine in five categories were asked from consumers of caffeine. These categories include appetite suppression, social mood enhancement, energy/work enhancement, withdrawal/dependence, and physical performance enhancement. In the category of appetite suppression, largest proportion (77.1%) of participants perceived that caffeine suppresses their hunger. Regarding social mood enhancement, the majority of participants perceived (79.8%) that caffeine makes them feel happy. In questions related to energy/work enhancement, the largest proportion (83.4%) perceived that caffeine makes them feel more alert. About questions related to withdrawal/dependence, the majority of students (75.5%) perceived that they will experience headaches without caffeine. In the category of physical performance enhancement, the largest proportion of participants perceived that caffeine improves their athletic performance. (Table-2)

Variable		Male n=278	Female n=392	Total n=670	p- value
Caffeine Consumer	Yes	222 (79.9%)	284 (72.4%)	506 (75.5%)	0.03*
	No	56 (20.1%)	108 (27.6%)	164 (24.5%)	
Caffeine intake form	Coffee	55 (24.8%)	61 (21.5%)	116 (22.9%)	0.716
	Tea	115 (51.8%)	159 (56.0%)	274 (54.2%)	
	Chocolate	29 (13.1%)	39 (13.7%)	68 (13.4%)	
	Energy drinks	23 (10.4%)	25 (8.8%)	48 (9.5%)	
P value ≤ 0.05 was considered significant					

**Table-1:** Socio-demographic characteristics

Perception of effects of caffeine in consumers		Frequency	%
<b>Appetite Suppression (n=506)</b>	Suppress feeling of hunger	390	77.1
	Decrease appetite	342	67.6
	Allows to skip meals	310	61.3
	Helps to avoid eating more than usual	298	58.9
	Helps to control weight	316	62.5
<b>Social/Mood Enhancement (n=506)</b>	Caffeine makes friendlier	354	70
	Conversations are better with caffeine	318	62.8
	Feel more sociable after having caffeine	354	70
	Feel more confident after having caffeine	352	69.6
	caffeine makes feel happy	404	79.8
	Caffeine improves mood	344	68
<b>Energy/Work Enhancement (n=506)</b>	Caffeine makes feel more alert	422	83.4
	Caffeine picks up when feeling tired	384	75.9
	Caffeine makes feel more energetic	408	80.6
	Feel less sleepy after having caffeine	320	63.2
	Caffeine helps to work over long periods of time	404	79.8
	Caffeine increases motivation to work	372	73.5
	Caffeine improves concentration	394	77.9
	Caffeine improves attention	390	77.1
<b>Withdrawal/Dependence (n=506)</b>	Experience caffeine withdrawal without caffeine	420	83
	Need caffeine everyday	372	73.5
	Get headache if went without caffeine	382	75.5
	Strong desire without usual amount	370	73.1
	Feel miserable without usual caffeine	328	64.8
	Difficulty starting day without caffeine	324	64
	Feel sick if went without caffeine	326	64.4
	Trouble giving up caffeine	366	72.3
	Often crave caffeine	360	71.1
	Get anxious if abstained from caffeine	380	75.1
	Unable to function without caffeine	374	73.9
<b>Physical Performance Enhancement (n=506)</b>	Workouts are better after having caffeine	336	66.4
	Exercise longer if have caffeine	286	56.5
	Improves athletic performance	370	73.1

**Table-2:** Perception of effects of caffeine in consumers

Perception of effects of caffeine in two categories were asked from non-consumers of caffeine. These categories were anxiety/negative physical effects and sleep disturbance. In the category of

anxiety/negative physical effects, majority of participants (81.7%) reported that they don't take caffeine because it makes their heart beat irregular and in the category of sleep disturbance, the largest proportion (74.4%) reported that they don't consume caffeine because they feel difficulty in sleeping after caffeine. (Table-3)

Perception of effects of caffeine in non-consumers		Frequency	%
Anxiety/ Negative Physical Effects (n=164)	Caffeine makes feel nervous	110	67.1
	Easily stressed after having caffeine	106	64.6
	Caffeine makes jittery	114	69.5
	Even small amount of caffeine makes anxious	100	61
	Don't like the way caffeine makes feel	132	80.5
	Caffeine makes irritable	126	76.8
	Caffeine makes heartbeat irregular	134	81.7
	Caffeine makes to sweat	118	72
	Caffeine upsets stomach	104	63.4
Sleep Disturbance (n=164)	Using caffeine late in day disrupts sleep	120	73.2
	Caffeine late in day gives insomnia	102	62.2
	Difficulty sleeping after having caffeine	122	74.4
	Caffeine at any time of day throws off sleep	96	58.5

**Table-3:** Perception of effects of caffeine in non-consumers

## DISCUSSION

The aim of current study was to determine the frequency of caffeine consumption and perception of its effects among university students and we found that high proportion (75.5%) of the participants was caffeine user. These findings are consistent with the results of different studies describing a high consumption of caffeine among youngsters worldwide.<sup>4,7,8,9,10</sup> The present study concluded that among all the caffeinated products, the use of tea was found to be most common (51.8%). These results also corroborates with the findings of a similar research which shows a high consumption of tea among Pakistan population.<sup>19</sup> This high utilization of tea may be associated with the societal dietary patterns as it is considered as the mandatory component of the breakfast. It has also been found that the consumption of caffeine was significantly high ( $p=0.03$ ) among males as compared to female participants of the study. These findings are also aligned with the evidence available

in the relevant global literature describing that the caffeinated products are more commonly used in males.<sup>20</sup>

It is worth mentioning that (77%) of the participants reported to use the caffeinated products for the suppression of appetite. However, this finding is not supported by the literature which describes that caffeine is not an effective appetite suppressant.<sup>21</sup> The participants reported that they consume caffeine because it enhances their mood. This perception was supported by another study which concludes that caffeine improves mood and enhances cognitive performance.<sup>22</sup>

Participants were using caffeine because they think that it enhances their energy. This perception was also supported by literature.<sup>23</sup> Another reason for consuming caffeine was that perception of experiencing withdrawal effects. This finding is consistent with the findings of a previous study.<sup>24</sup> There is evidence that this caffeine dependence can be reduced by education about caffeine sources and its ability to produce physical dependence.<sup>24</sup>

The non-consumer of caffeine reported that they experience anxiety and sleep disturbances after consuming caffeine. These perceptions are also supported in literature because caffeine consumption is found to be associated with anxiety related behavior and insomnia.<sup>25</sup>

The availability of caffeinated products and foods has been rising over the past decade. Due to this increased availability and usage people generally link certain perceptions with caffeine consumption. The optimal amount of caffeine usage varies in literature and depends on various factors like age, gender and presence of any disease. A considerable amount of literature has been published on the benefits and harmful effects of caffeine consumption.<sup>4,7,8,9,10,26,27</sup> The majority of the literature suggests that mild to moderate caffeine consumption is relatively safe, but that higher doses of caffeine consumption (>400 mg) can cause physiological, psychological, and behavioral harm.<sup>28</sup> The current article addresses an important public health issue and contributes to providing better understanding of perceptions that are linked with the effects of caffeine. The findings of this study are beneficial and can lead to implementing changes to promote healthier life style among university students

## CONCLUSION

The study concludes that male students had more tendencies towards caffeine consumption than females. Major perceptions of consuming caffeine

were feeling of alertness, experiencing caffeine withdrawal symptoms, feeling of energy and ability to work over long periods of time after having caffeine. The major perceptions for not consuming caffeine were irregular heartbeat, bad feelings, irritability, and sleep disturbances

For university students, education is a primary need which should not be dependent on consumption of caffeine or any other substance that is thought to enhance mental and physical performance. Students should be guided to enhance their learning ability through stress management techniques, improvement in sleeping and eating habits, time management, and involvement in physical activities

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