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Original Research Article

Knowledge, attitude and practices towards consumption of caffeine containing drinks among medical college students in Chennai

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ABSTRACT

Background: Indian population has been accustomed to caffeinated beverages since time immemorial. Globally, they have become the most preferred drink since the bloom of the twentieth century. However, unbridled consumption has been associated with many side effects. The objectives of this study were to assess the knowledge, attitude and practices among medical students with respect to caffeine containing drinks, and to determine the relationship between caffeine consumption and body mass index (BMI).
Methods: It was a cross sectional study. Data was collected through a self-administered, pre-tested questionnaire after getting informed consent. The questionnaire was in a semi-structured format.
Results: A total of 372 medical students took part in this present study, out of which 312 (83.6%) students responded to have the habit of taking caffeinated beverages, coffee (58.06%) being the maximum preferred drink and taste (49.1%) being the leading reason. Mean BMI was 22.16 with 50% being normal and, 16%, 17% and 17% being underweight, overweight and obese respectively. Withdrawal effects were experienced by 47.4% of students on stopping them for at least a day. 88.7% of medical students were aware of caffeine addiction and 62.5% were confident that they can stop over drinking them after knowing the ill effects.
Conclusions: The study showed that students were not following healthy practises of caffeine consumption, albeit the knowledge of caffeine addiction, in terms of BMI. However, with proper health education and awareness, the students are ready to change their views and practises regarding caffeine consumption.

Keywords: Addiction, Adolescents, BMI, Caffeine, Energy drinks, KAP, Medical students, Obesity

INTRODUCTION

Indian population has been accustomed to caffeinated beverages since time immemorial. They have become the most preferred drink since the bloom of the twentieth century, most notably as a vogue worthy and mind rejuvenating supplement to our system. With large influence backed by the commercial ads, introduction of fast foods and liberal consumption of traditional Indian beverages in our household, there has been a proliferation of cafe chains, vending machines and caffeinated beverages during recent times. However increased consumption when not overseen have been associated with many side effects.

The term energy drink refers to group of beverages used by consumer to reduce fatigue, provide energy, promote wakefulness, maintain alertness and provide cognitive and mood enhancement. The main ingredient of energy drinks is caffeine.[1] Caffeine is a central nervous system stimulant of methyl-xanthine class.[2] It is the world's most actively consumed psychoactive substance. It is commonly found in the seeds, nuts or leaves of a number of plants native to Africa, East Asia and South America.

According to the Food and Drug Administration (FDA), it is considered as generally recognized as safe (GRAS).[2] Caffeine is present in a wide range of products, namely, coffee, tea, soft drinks, hot chocolates, and confectionery such as chocolates and over-the-counter medications including cold remedies and analgesics.[3] Currently, over 10 million packs of coffee are consumed globally.[4] The typical content of caffeine in commonly used drinks is as follows: tea (45 mg/cup), instant coffee (60 mg/cup), brewed coffee (100 mg/cup) and cola drinks (20-25 mg/can).

Researches revealed the use of energy drinks in the following six situations: for insufficient sleep, to increase energy, while studying, driving long periods of time, drinking with alcohol while partying and to treat a hangover.[5] Although caffeine consumption does provide the above said benefits, the addictive capacity potentiates the consumers to succumb towards caffeinism. Caffeine activates the dopaminergic system and this attributes to its addictive nature.[6] If you feel like you cannot get going in the morning, feel overtired during the day from not having caffeine, or get headaches when you try to stop taking caffeine regularly, these are signs of dependence.[7]

The term "caffeinism" refers to an acute intake of caffeine exceeding more than 250 mg/day and is characterized by: restlessness, nervousness, excitement, insomnia, flushed face, diuresis, GI disturbances, muscle twitching, rambling flow of thought and speech, tachycardia or arrythmias, periods of inexhaustibility, psychomotor agitation.[8] Caffeine causes decreased classroom performance, sleep deprivation, and viewing its addictive nature, caffeine is a giveaway drug. It is associated with several behavioral problems such as substance abuse, increased fighting, increased addiction to alcohol and smoking.[9]

Caffeinated drinks are associated with many deleterious effects on the human body and mind. These include obesity (due to decreased satiety and fullness sensation with high sugar beverages), diabetes (due to increase sugar content), tooth decay (demineralization of enamel), nutritional deficiencies, heart disorders (due to metabolic and hypertensive effects) and many neurological disorders (due to high concentration of caffeine).[5] Frequent consumption of caffeine during childhood and adolescence may affect the development of brain centers responsible for planning and emotional control.[6]

Drinking sugar-added caffeinated beverages creates the concept of "empty calories", i.e., consumption of a drink will cause satiety but has little nutritional value and globally causes obesity.[10] Furthermore, increased consumption of high sugar drinks may enhance the liking and need towards other sugar rich confectioneries such as sweets which may lead to increased incidence of obesity. Coffee affects HCL secretions in the stomach. They might demineralise the tissues. Tea has an inhibitory function on absorption of nonheme iron and may block vitamin B_1 inactivation.[7] Though soft drinks might appear to apparently suffice; it mainly constitutes carbon dioxide and phosphoric acid which fizzes out when opened. The high acidity (pH ranging from 2,5 to 3.4) of a soft drink leads to gastronomic distress due to erosion and inflammation of gastric mucosa. A notable association of dental carries have been reported due to high sugar content in them, affecting the enamel, outermost covering of a tooth. Soft drinks are known to erode calcium from our body, reportedly leading to nephrolithiasis (kidney stones). In most of the caffeinated beverages, caffeine is deliberately added to make it more addictive. Moreover, caffeine in carbonated drink is more easily absorbable than any other drink (like tea, coffee, chocolate etc).[11]

The cap that FSSAI is proposing for energy drinks- 300 ppm caffeine, and two cans (500 ml) of energy drinks per day, with minimum amount of 145 ppm of caffeine per drink is especially of concern, since these energy drinks are openly sold despite the warning label for 'children, pregnant mothers, youngsters and sportspersons'.[12]

Therefore, the present study has been undertaken to find out what the medical students know about caffeinated drinks, their practises regarding how often they consume, for what reasons, and their attitude regarding the harmful side effects. Limited studies have been done to decipher the relationship between caffeine consumption and body mass index, therefore the present study aims to determine the same.

METHODS

Study design

The investigation was studied among first year to third year MBBS undergraduates at Government Medical College, Omandurar Government Estate. The students were selected based on inclusion and exclusion criteria.

Inclusion criteria

All undergraduate students from first to third year MBBS students from Government Medical College, Omandurar Government Estate were included.

Exclusion criteria

Students who were not present for that session and students who were not willing to participate in the study.

Sampling method

All the undergraduate students were included by universal sampling method and the cross-sectional study data was taken from October to November 2018. Out of 400 students, 372 students participated.

Data collection

Data was collected through a self-administered, pre-tested questionnaire after getting informed consent. The questionnaire was in a semi-structured format. All the data collection forms were cross checked for completeness and made unambiguous and error free. Height was measured using stadiometer and weight was measured using a calibrated electronic weighing machine. BMI will be calculated using Quetelet's index. A pilot study was conducted with 40 students before standardizing the questionnaire.

Statistical analysis

The collected data was entered on Microsoft excel sheet and analysis was made using epi-info analysis with appropriate descriptive and inferential statistical methods.

RESULTS

The questionnaire comprised of demographic details; 13, 6, and 12 questions regarding practices, knowledge and attitude respectively.

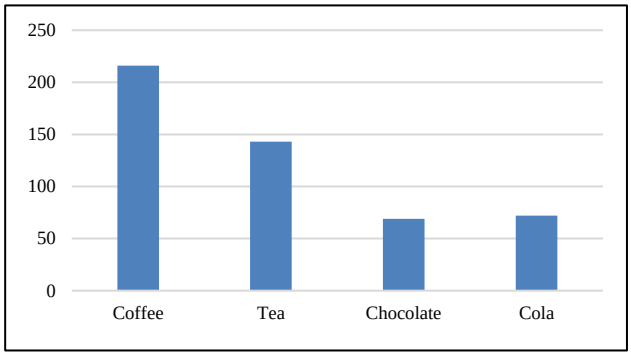

Figure 1: Most preferred drink.

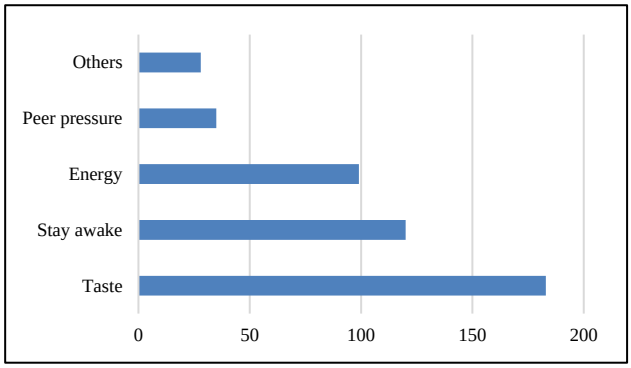

Figure 2: Reason for preference.

The total number of medical students who took part in the study were 372 out of which 181 (48.6%) were males and 191 (51.3%) were females. Age groups ranged from 17 to 24 years with mean height of 1.663 metres and weight of 61.47 kg. Around 312 (83.6%) students have caffeinated products on a regular basis and majority (216) of students drink coffee, additionally 143 students drink tea, 141 students take caffeine in the form of chocolates (69) and cola drinks (72).

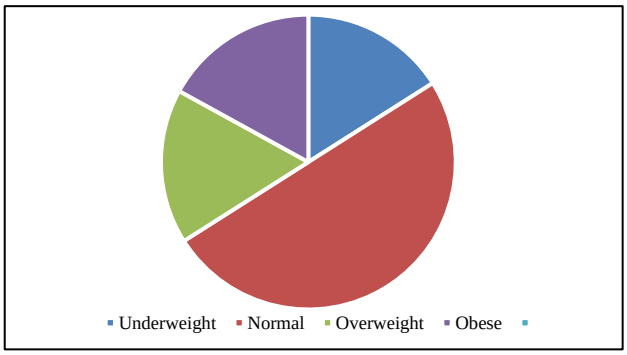

Figure 3: Body mass index distribution.

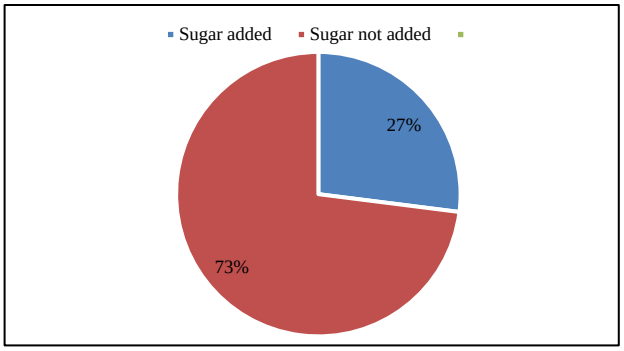

Figure 4: Sugar added or not.

According to the Asian standard scale for BMI classification, 185 individuals have normal standard range (172 amongst students who take caffeinated drinks on a regular basis), 59 were underweight and 64 were overweight and 64 (16 of them take caffeine on a regular basis) belonged to obese category. 288 (73%) participants prefer sugar in their caffeinated drinks.

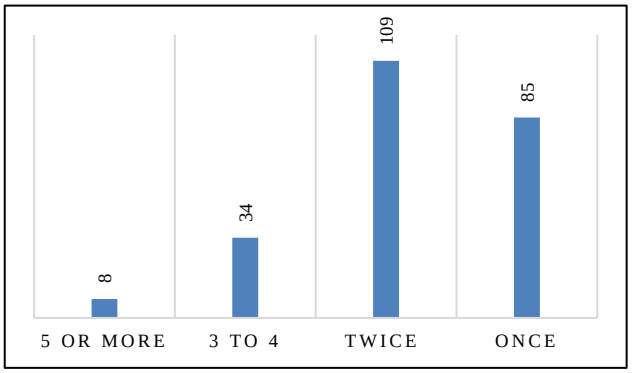

Figure 5: Rate of consumption.

Majority of students (109) answered that they consume these drinks twice a day, 85 students once, 79 students consume them once in a while, 55 do not consume them as much, 34 students 3 to 4 times and 8 students consume five or more times per day. Increase in consumption has been seen in 30% of students since joining college mainly due to stress (25%) and to stay awake (19%). 41.1% students take them before studying and 54.5% do not mind taking them on empty stomach.

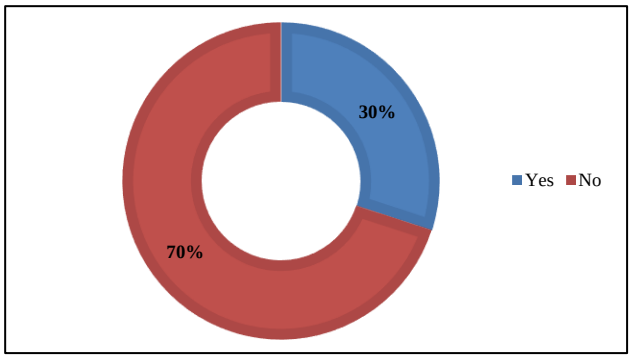

Figure 6: Increment of consumption rate.

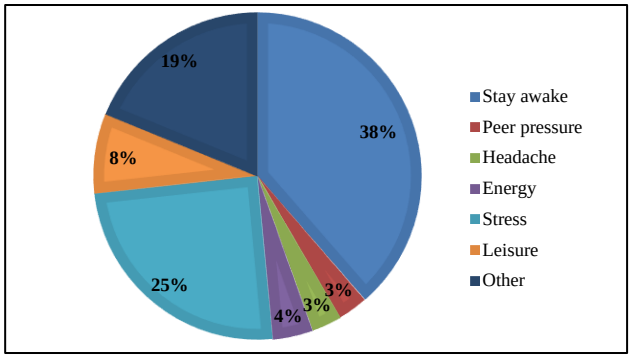

Figure 7: Reason for increase in consumption.

Withdrawal symptoms noted by participants when stopped for at least a day included headache (24.7%), anxiety (5.3%), insomnia (4.3%), nervousness (2.6%), palpitations (2.4%), tremor (1.6%), all of the above (1.8%). When asked to rate their dependence out of a score of 5, 15.3% gave a 5, 4.8%, 14.24%, 22.04% and 43.04% gave 4, 3, 2 and 1 respectively.

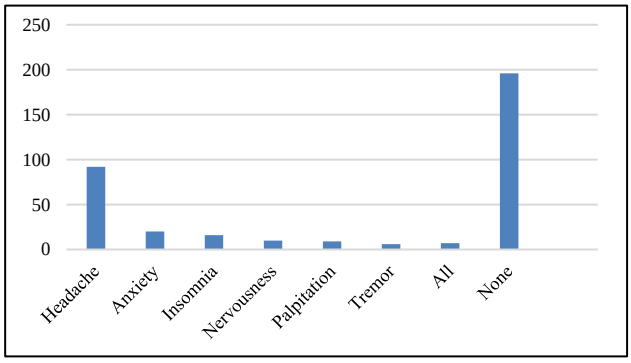

Figure 8: Withdrawal symptoms.

88.7% of students were aware of caffeine dependance and 62.9% were confident of changing their practices in view of caffeinism.

DISCUSSION

Caffeinated drinks in the present day scenario have become part of our regular diet, regardless of our ethnicity, its derivatives have been inculcated into our roots right from our childhood practices either by our own accord or external influences of our elders, insurmountable to resist. The present examination shows that acculturated westernised forms of caffeine namely carbonated beverages are also an equal contributor the caffeine in our system.

From the above data, majority of the participants (83.6%) show interest in consumption of caffeinated products with majority choosing coffee (58.06%). From the present study, caffeinated drinks have been introduced quite early, with majority fitting in the age group of five to ten years, and a fair number (52.1%) have been habituated to drinking once or twice a day in general, with 12.04% of people drinking more than two times a day, taste (77.4% prefer with sugar) and refreshing energy being the undeniable reasons, 41.1% taking them just before studying. While the consumption has increased since joining the course for 29.8% of medical students, it has mainly been due to stress, especially during exam/late night study sessions.

As discussed by similar study done among adolescents in Delhi by Gera et al, average daily consumption of caffeine in our study population thus far exceeds that reported in developed nations, which is alarming. Most of this caffeine is coming from coffee (frequency 2-3 times per day) since it contains much more amount of caffeine as compared to other beverages.[13] Though it is to be noted that the rate of absorption of caffeine from carbonated drinks is more quick, that 72 (19.35%) of people have agreed to consume them in the present study.

Contingent on the amount of caffeine expended the US Food and Drug organization, and American Medical Association has classifications it into three extraordinary class: low intake: utilization up to 199 mg/day i.e. 1 cup of any caffeinated beverage/per day, (2) moderate intake: utilization of around 200-399 mg/day i.e. 2 cups of any caffeinated beverage/per day, and (3) high intake: utilization more than 400 mg/day i.e., 5 or more cups of any caffeinated beverage per day.[11] Although caffeine ingested in lower doses has been shown to have positive effects, Brice and Smith found that low dose of caffeine (less than 200 mg/65 mg taken four times over a five hour period) taken over time or all at once had a positive effect on alertness, improved performance on simple and choice reactive tasks, improved performance on a cognitive vigilance task and a task requiring sustained response, and dual tracking/target detection. They also found that both doses increased anxiety.[11] However, as cited by

Kaplan et al, caffeine abuse beyond 400 mg (more than five cups per day) can make a person irascible, even to a point that it is detrimental to our concentration. Moderate consumption (200 to 399 mg/day) on a regular basis are known to hinder the very aptitudes it is known to improve, namely memory retention or sleep resistance.[11]

The unswerving trend of caffeine abuse have shown its effects both in dependence and the withdrawal effects, as caffeine is considered a drug. Caffeine may not be considered as the epitome example of the term addicted or abuse potential drugs when compared with the famous drugs of cocaine, heroin and nicotine, though caffeine users have reported to have got addicted to caffeine in a sense that they were unable to cut down or quit their caffeine use. A study done by Mayo clinic showed that people may experience different reactions to caffeine depending on regular caffeine consumption, body mass, age, medication use, and health conditions such as anxiety disorders. Their research also suggests that men are more susceptible to harmful effects of caffeine than women. Caffeine can also have a major impact on sleeping habits.[11] In the present study, 20.3% have rated 4 and above on a scale of 5, and withdrawal symptoms, 24.7% agreeing to headaches, anxiety (5.3%), nervousness (2.6%), tremors (1.6%), palpitations (2.4%), with 1.8% accepting to have had all of them. However, individual differences in sensitivity and tolerance affect the severity and likelihood of experiencing negative effects. For regular caffeine users, the avoidance of low-grade withdrawal symptoms, such as drowsiness after overnight abstinence, has been identified as a central mechanism underlying the reinforcing effects of caffeine.[14]

In the above study, significant number of people have fallen in underweight, overweight and obese category. The age-old belief of consuming high sugar beverages to be equivalent to a healthy wholesome meal is sadly still prevailing amongst youngsters. Energy drinks are still widely consumed in the group of adolescents and adults, with a partial lack of sound scientific knowledge. Though one should be well aware of the concept of empty calories in soft drinks and the alike, surprisingly a good number of students have reportedly skipped their meals or had these caffeinated beverages empty stomach. Coffee delayed the rise of insulin in response to the standardized meal and the fall of glucose concentrations from its maximum levels in the entire study sample. Studies in China, as done by BMI had a positive significant association with increased caffeinated drinks consumption (B=0.05, SE=0.01, p<0.01), high physical inactivity time (B=0.18, SE=0.04, p<0.01), and reduced physical activity time (B=−0.44, SE=0.04, p<0.01).[15] When compared gender wise, study conducted by Zhang et al concluded that coffee intake may be modestly associated with lower adiposity as indicated by BMI and WC, particularly in men. While the benefit of coffee intake against obesity was not as fundamental as balanced diets and physical activity.[15] In subgroup analysis by sex, higher coffee intake was associated with reduced central obesity in men (summary RR=0.90, 95% CI=0.66, 1.23) but increased central obesity in women (summary RR=1.18, 95% CI=0.75, 1.86). However, the associations were not statistically significant and there was no evidence of heterogeneity by sex (heterogeneity =0.59).[16] According to a randomised cross over study by Gavrieli et al glucose incremental area under the curve (IAUC) was significantly different between interventions (p=0.009) with both coffee amounts inducing a greater area compared to water. Secondary, subgroup analysis at the nominal level showed that this might be more evident among females (PIAUC=0.05) and overweight/obese participants (PIAUC=0.03).[17]

In a scenario where the average daily consumption of caffeine among adolescents and youngsters in India is not yet documented, a cap of 300 ppm caffeine in ‘energy drinks’ should not be allowed. Moreover, with multitude of caffeine sources such as coffee, tea and soft drinks, there is enormous accumulation caffeine in our system. Furthermore, a large proportion of energy drinks are being misused and consumed with alcohol leading to cognitive impairment.

To our knowledge, a limited number of cross-sectional studies have been undertaken in India to determine the awareness of caffeine consumption and its effects in our system. The study was conducted on a small sample size and may not reflect the entire adolescent and adult population. The reliability of a self-reported questionnaire might be another drawback of the study.

Despite these limitations, however, the study does point towards an increasing trend of caffeine consumption amongst Indian youngsters. This should act as an eye opener for setting up appropriate upper limits for caffeine content in beverages and various food products.

CONCLUSION

The study showed that students were not following healthy practises, measured principally through the relation of BMI with caffeine consumption, albeit their knowledge of caffeine addiction. However, with proper education and awareness, the students are ready to change their views and practises regarding caffeine consumption. Students have a good attitude towards changing their habits. With more specific knowledge and the clearance of common myths, good practises can be inculcated. Though caffeinated beverages have become an unreplaceable drinking our routine diet, with proper capping of caffeine content in energy drinks and instillation of proper habits in our present youth, caffeinism can be curbed significantly. Although known for its therapeutic effects, many studies are yet to be done in this domain for more insight and being more advertent about its ill effects if abused beyond that which is required.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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