Original Research Article

A study on caffeine consumption and its association with stress and appetite among call centre employees in Mumbai city, India

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ABSTRACT

Background: Caffeine is a widely-consumed chemical having controversial effects. Caffeine may interact with the satiety and may be associated with stress levels. The frequency of caffeine consumption among call centre employees is known to be high. The aim of the study was to assess the caffeine intake and it's association with appetite and stress levels among call centre employees aged between 25-35 years

Methods: A cross sectional study with purposive sampling was done from a call centre at Mumbai, India. Anthropometric measurements and structured questionnaires were used for data collection.

Results: The average caffeine intake was 200mg/day through coffee and 150mg/day through tea among the habitual consumers. As per the scoring categories of adapted appetite questionnaire (CNAQ), 54.7% of the participants were at risk to abnormally low appetite. The stress questionnaire results showed that 84.6% of the participants were at high risk to stress. Significant negative association was found between appetite score and coffee consumption (r=0.55,p<0.001), coffee consumption plus smoking (r=0.476,p<0.05) and tea consumption (r=0.300, p<0.05) respectively. A significant difference (p<0.01) was observed between the mean appetite score of habitual smokers and non-smokers; mean appetite score of non-smokers was greater. No significant association was observed between caffeine consumption and stress.

Conclusions: Caffeine had a negative impact on the appetite levels. Smoking was observed to worsen the effect of caffeine on appetite.

Keywords: Appetite, Caffeine, Call centre, Obesity, Stress

INTRODUCTION

Caffeine is a globally consumed chemical substance naturally found in tea, coffee, and cocoa; and is added in cola drinks, energy drinks, nutritional supplements and certain drugs.[1] The consumption of caffeine rich products is preferred among people from various professions requiring more attention because it is a central nervous system stimulant and it is also helpful in increasing alertness.[1]

Caffeine has also been found to show neurological benefits, may induce weight loss in overweight and obese individuals by increasing resting metabolic rate, thermogenesis and fat oxidation.[3-4]

Evidences also suggest that caffeine may lead to harmful effects on health. It may interact with satiety and is also associated with stress levels in individuals.[5] Caffeine may have an adverse effect on insulin dependent glucose uptake, irrespective of obesity, type 2 diabetes and

exercise, heart rate and blood pressure.[6,16] The risk of myocardial infarction with caffeine is higher in present or past smokers.[7] Caffeine may increase blood pressure, risk of negative cardiovascular consequences and may enhance stress responses in men as well as women.[8,9] If combined with high dosage of sugar, may cause obesity and overweight.

Caffeine consumption trends among students and professionals

High consumption of caffeinated beverages is one of the coping strategies used by college students in the management of stressful academic situations, as has been reported in several studies.[2]

In present study, we focused on call centre/ business process outsourcing employees, who also report to have high adherence to caffeine consumption to tackle the major concern of their work pattern, night shifts and deadlines for target achievements. Therefore, they are more prone to mental stress.[10,11] In India, the spread of advanced information and communication technologies has been exponential in last two decades. India is a home to thousands of domestic and International call centres where the clients are from developed countries. Hence, the time zone difference leads to majority of the work shifts during night, which in turn leads to reduced sleep quality and health. Due to this reason, the call centre employees look out for the stimulants to remain alert and concentrate on the work, which later becomes an addiction. Hence, this study was designed to assess the pattern of caffeine consumption among the call centre employees of Mumbai, India and its association with stress and appetite scores.

METHODS

This was a cross sectional study with purposive sampling. The inclusion criteria for participants was the age group (25-35 years), the job profile (call handlers), and those who willingly agreed to participate in the study. The exclusion criteria involved known cases of any of the conditions like pregnancy, hypertension, and history of cardio vascular diseases, hypothyroidism or depression and were on any medication for the same.

Total 117 participants were enrolled from an International call centre in Malad, Mumbai, India. There were n=90 males and n=27 females.

Data collected on anthropometry was comprised of weight (measured using digital weighing balance, TANITA make) and height (measured using stature meter). Semi structured questionnaire was used to derive information on source of caffeine and it's safe limit for consumption. Qualitative assessment of caffeine and antioxidant consumption was done using food frequency. Appetite and stress levels were also assessed using structured questionnaires. Appetite scoring was done

using an adapted standardized questionnaire of Council on Nutritional Appetite (CNAQ, 2005).[3] However, stress scores were derived using a stress questionnaire designed by International Stress Management Association (ISMA, 2013), United Kingdom.

Classifications

Appetite (CNAQ)

It contains eight items with five options for each. The modified scoring categories were 7-14 (at risk of anorexia and needs nutritional counselling), 15-24 (needs frequent reassessment) and >24 (not at risk).

Stress (ISMA)

There were 25 items which required to be answered as 'yes' or 'no'. Every 'yes' was given one and 'no' was given zero score respectively. The scoring categories were <5 (least likely to suffer from stress), 5-13(more likely to suffer from stress) and ≥14 (most prone to stress).

Body mass index (BMI) (kg/m^2)

World Health Organization (WHO) 2004 classification for Asian Adults (Underweight: <18.50; Normal: 18.50-22.99; Pre-obese: 23-27.49; Obese: ≥27.5)

Statistical analysis

Data was analyzed using the Statistical Package for the Social Sciences (SPSS version 16.0). Mean and standard deviation were used for quantitative data and frequency distribution was used for qualitative data. Means were compared using independent 't' test and percent distribution was compared using chi square. Further, Pearson's correlation was used for associating various parameters.

RESULTS

Background information

The data was collected on 117 subjects, where male (76.9%) population was three times higher than the females (23.1%) (ratio 3:1). Majority of the participants, 82.1% (n=96) worked in the night shift. The background information on their anthropometric measurements and age showed that the mean age (years) of the studied population was 27.66±2.60. Mean height (cm) was 168.3±9.01 and mean weight (kg) was 68.9±13.02 of the studied population. The average BMI (kg/m^2) was 24.27±3.81 of the total population, 23.93±4.86 was that of the female population and 24.37±3.46 was of the male population. The mean comparison on height and weight showed a significant difference (p<0.05) between both the genders (data not presented).
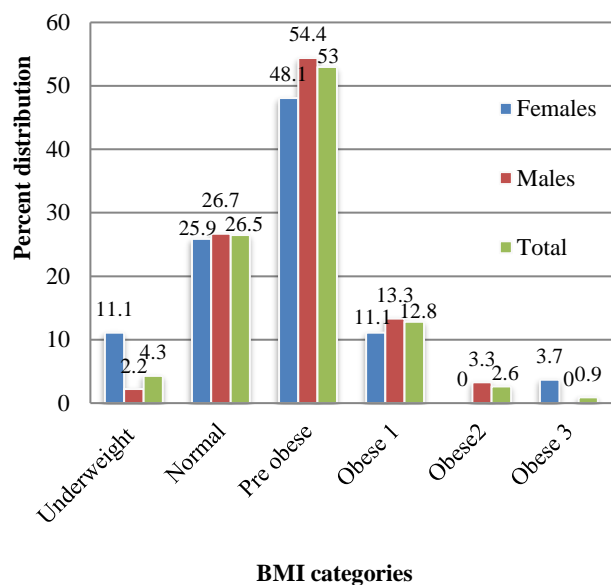
Figure 1: Percent distribution of the subjects using BMI categories
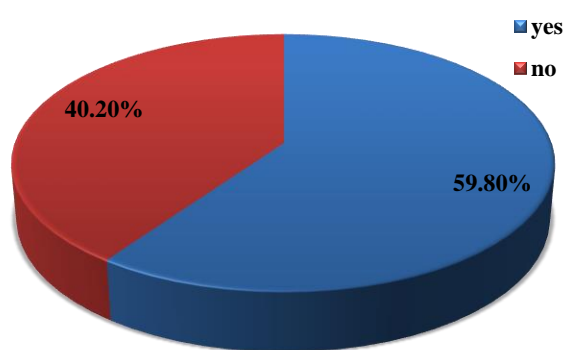

Figure 2(A): Foods other than coffee contain caffeine?
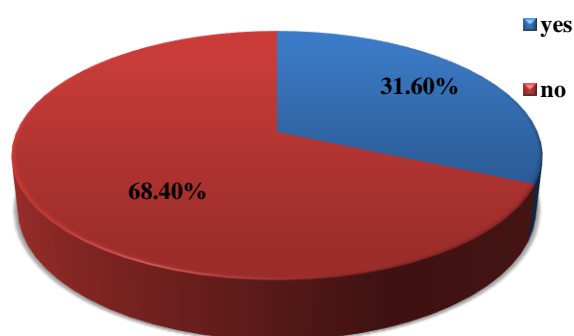

Figure 2(B): Do think that the daily amount of caffeine consumed by you is healthy?

Figure 2: Knowledge based questions.

On distributing the participants into various BMI categories (Figure 1), 53% (n=62) of the participants were observed to be pre-obese, indicating that majority of them were at high risk of being obese. However, 26.5% (n=31) had normal BMI and 4.3% (n=5) were underweight.

Information on caffeine consumption

Data on general information (Figure 2) regarding caffeine showed that 40% of the participants were unaware about the caffeine containing foods and majority of them did not know about the safe limit for caffeine consumption per day.

Caffeine and antioxidant intake

Data on food frequency results revealed that tea (65.81%) and coffee (34.18%) were the most common sources of caffeine which were consumed daily by the studied population followed by aerated drinks like Pepsi (8.54%), Mountain dew (4.7%), Coca cola (2.5%) and chocolate drinks as milk chocolates (9.4%) and dark chocolate (6.8%). An average caffeine intake was 200mg/day through coffee (two and a half cups) and 150mg/day through tea (three cups) among the habitual consumers.

Consumption of antioxidants was observed to be poor, where tomatoes (45.29%) were consumed daily as widely used source, followed by citrus fruits (14.52%), almonds and walnuts (9.4%).

Appetite and stress scores

As per the scoring categories of modified appetite questionnaire (CNAQ) used in this study, 54.7% (n=64) of the participants were at risk to abnormally low appetite (Figure 3). Mean appetite score of the total population was 24.16±3.98, it was observed to be slightly higher in males (24.28±4.07) than in females (23.78±3.71).
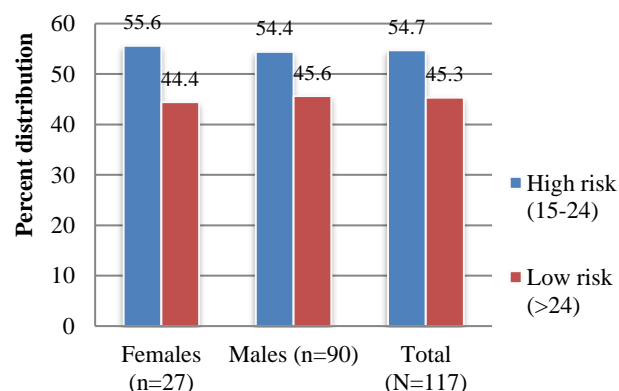
Figure 3: Percent distribution for appetite categories.

Further, the stress questionnaire (ISMA, 2013) results showed that 84.6% (n=99) of the study subjects were at high risk of stress (Figure 4). Mean stress score was 8.67 ± 3.34 among the study population. It was observed to be higher in females (9.07 ± 3.06) in males (8.54 ± 3.42).
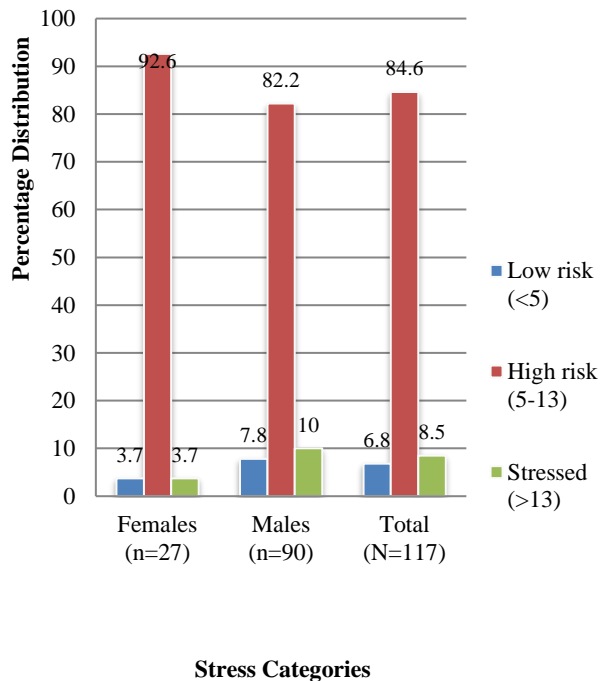

Figure 4: Percent distribution for stress categories.

Correlations

A significant negative association was found between coffee intake and appetite score (r=0.55, p<0.001), indicating that the appetite score was lowered with higher coffee consumption. Also there was a significant negative association observed between tea consumption and appetite scores (r=0.300, p<0.05). Habitual smoking along with daily coffee intake had a significant negative association with appetite scores (r=0.476, p<0.05). A significant positive association was observed between daily tea consumption and body weight (r=0.34, p<0.05), this may be due to the sugar content or type of milk used to prepare tea. A significant difference (p<0.01) was seen between the mean appetite score of habitual smokers and non-smokers; mean appetite score of non-smokers was greater. Similarly, the mean appetite score of the participants with daily tea consumption and smoking was significantly (p<0.001) lower than those who consumed tea daily but did not smoke. The analysis of frequency and percentage of responses, revealed a significant difference between both the genders for the item of stress questionnaire on 'Increase in muscular aches and pains'; which was significantly (p<0.05) higher in females compared to males. Stress scoring did not correlate with caffeine intake and smoking.

DISCUSSION

The knowledge of the studied population on caffeine with respect to its sources and health effects on health was found to be inadequate.

Various researchers have reported BMI categories of the call centre employees. Upadhyay P et al, showed that 22% of the subjects in Delhi were pre-obese and obese, Naveen R reported that 42.03% of participants in Bangalore had more than normal BMI.[10,11] Another study in Mumbai and Pune BPOs reported 24% of the participants were obese where as in our study almost half of the population (53%) was pre-obese.[12] Caffeine may induce insulin resistance and hypertension among habitual consumers, exacerbating the risk to metabolic syndrome.[17] The risk is higher in Indians due to the slower CYP1A2 activity leading to slower metabolism and longer exposure of caffeine.[17]

Tea and Coffee were the most common sources of caffeine consumed by the studied population. A study by Naveen R showed that, 69.3% of the study population consumed coffee and 61.9% of them consumed tea.[10] Jeyapal D et al reported high intake of stimulants in the form of tea, coffee and cola drinks among the studied call centre employees in Delhi, India. However, the amount and frequency of its consumption were not assessed.[13] It is reported that smoking may reduce appetite. Cigarette smoking and high caffeine consumption are the common practices among the call centre employees. Cigarette smoking was a common practice among more than 40% of call centre employees studied in past, these findings support our results.[10]

Our results also showed that smoking along with caffeine consumption had a stronger negative impact on appetite compared to only caffeine consumption or only smoking. A study by A. Jessen et al stated that caffeine's attenuating effect on appetite is amplified by nicotine, thus supporting the results of current study where the appetite was found to be lower among subjects who smoked and consumed coffee/ tea regularly than those who consumed only tea/coffee and did not smoke.[14]

In present study, the participants were observed to have high risk for metabolic syndrome disease because majority of the population were pre-obese, at high risk to mental stress and indulged into smoking, indicating a need for health and nutrition literacy along with the lifestyle modifications to overcome the risk factors.

A study by Hewlett P and Smith A found a significant association between smoking and caffeine consumption, whereas the present study did not show significance in their association.[15] However, the previous study observed a highly significant association between stress and smoking, which was observed to be non significant in our study. Charbotel B et al reported a significant association between muscular aches and stress level, as

also seen in the present study.[16] Josue L. Rios et al studied caffeine consumption in students with academic stress, they too found no significant correlation between caffeine consumption and stress.[2] Similarly, Conway TL et al also reported no significant correlation between caffeine intake and stress.[5] The findings also substantiate our study outcomes.

Limitations

First, the studied population had an unequal number of males and females, thus the effects of caffeine could not be compared on the grounds of gender. Second, certain factors which may have an association with the effects of caffeine, such as, alcohol consumption, physical activity level, physiological stress, levels of stress hormones and sleep pattern could not be examined

CONCLUSION

The current study concludes that caffeine may induce satiety and smoking augments this effect of caffeine on appetite. The studied population is at high-risk to abnormally low appetite and high stress.

Therefore, there is a need to plan and implement interventions to bring about change in healthier lifestyle.

Recommendations

In future studies, biochemical parameters that indicate the cardio vascular disease risk such as blood pressure, lipid profile, heart rate and glucose tolerance also could be included. Sleep disorder should be examined in individuals with high caffeine consumption.

Caffeine addiction or withdrawal symptoms should be studied in detail among individuals with high caffeine consumption. Individuals should be interrogated to study their reasons for caffeine consumption. Healthier alternatives to caffeine for its stimulating effects should be studied.

ACKNOWLEDGEMENTS

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