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Research Paper

Patterns of Caffeine Consumption among Urban Indians: A Cross Sectional Study

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ABSTRACT: *The tea and coffee culture has become ubiquitous over the years, making tea the second most drunk beverage in the world after water (1). The aim of our study was to estimate the prevalence of caffeine dependence in urban India using a cross sectional, self reported survey design. On 19 December 2020, we conducted an online survey in order to analyse the caffeine intake and thereby the prevalence of caffeine dependence amongst the respondents of our study. Nineteen respondents (10.1%) were observed to be dependent on caffeine according to the DSM-IV criteria using proxy questions. While all of the caffeine dependent participants reported one or more issues with sleep, 43.04% of the others had no problems with sleep at all. From dependence to sleep disorders, caffeine consumption has a tremendous impact on our health, both physical and mental. It's perceived 'benign' nature makes its consumption more acceptable to society. Caffeinated drinks are not as harmless as recognised by most, and need to be consumed with caution.*

KEYWORDS: *Caffeine dependence, sleep disturbances, addiction, psychoactive drug*

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I. INTRODUCTION

The tea and coffee culture has become ubiquitous over the years, making tea the second most drunk beverage in the world after water (1). In many countries different forms of caffeinated beverages are offered to guests, friends and family as a gesture of courtesy. It has also become practice to conduct both official as well as casual meetings 'over a cup of tea/coffee'.

Caffeine dependence is defined as a pattern of behaviour focused on the repetitive and compulsive seeking and taking of caffeine (2). Considering caffeine leads to dependence (3), a global increase in the consumption of coffee and tea would naturally result in an increase in the caffeine dependent population.

The aim of our study was to estimate the prevalence of caffeine dependence in urban India using a cross sectional, self reported survey design.

II. MATERIAL AND METHODS

On 19 December 2020, we conducted an online survey in order to analyse the caffeine intake and thereby the prevalence of caffeine dependence amongst the respondents of our study. A questionnaire was created using Google Forms and was delivered to a range of individuals through Whatsapp on personal and group chats. The respondents consisted of individuals fluent in English who had access to Whatsapp on their phones.

A list of caffeinated beverages was provided in the questionnaire. From the list, the respondents were asked to select the beverages that they consumed along with the approximate quantity consumed by them on a daily basis. This was then converted into caffeine consumption per day in grams using standard conversion tables (4).

The rest of the questionnaire was designed keeping the 'Substance Dependence' criteria in mind from the fourth edition of the Diagnostic and Statistical manual of Mental disorders (DSM-IV), published by the American Psychiatric Association (5). To avoid bias, we utilised proxy questions to substitute those in the DSM-IV criteria (Table 1). A respondent was considered dependent on caffeine if he/she fulfilled three of four criteria.

III. RESULTS

There were a total of 188 respondents ranging from twelve to sixty eight years of age, with a large proportion of females (64.1%), probably due to the dominance of females in the sample selected. Of the total participants, 11 were non-caffeine drinkers. Figure 1 demonstrates the number of respondents that consumed a given amount of caffeine on a daily basis ranging from 22mg to 600mg, with most consumers in the 100 to 200mg range. As seen in the Table 2, more than one-third of the respondents believed that the caffeinated beverages they consumed were beneficial to them, 42.2% were of the opinion that they were of no consequence and 12% claimed that these beverages had a harmful impact on their body.

Nineteen respondents (10.1%) were observed to be dependent on caffeine according to the DSM-IV criteria through proxy questions (Table 1). While all of the caffeine dependent participants reported one or more issues with sleep, 43.04% of the others had no problems with sleep at all.

Regarding the criteria for Substance Dependence amongst the caffeine dependent respondents, all of them reported attempts at taking a break from consuming caffeine in the past, 42.1 % reported an increase in the total consumption of caffeine over time and 78.9 % experienced withdrawal like symptoms, such as uneasiness, headaches, lack of energy and irritability.

IV. DISCUSSION

4.1 Pharmacology of Caffeine:

Caffeine is a psychoactive drug, and specifically a stimulant. While psychoactive drugs are substances that, when taken in or administered into one's system affect mental processes like perception, consciousness and cognition (6), a stimulant is a substance that raises levels of physiological or nervous activity in the body (7). Being a stimulant, caffeine increases the activity of the brain by altering the process of neurotransmission. It's ability to inhibit adenosine receptors leads to the release of dopamine which in turn produces a pleasurable effect, thereby affecting behaviour and cognitive function (8).

4.2 Extent of the Problem:

Caffeine is the most widely consumed psychostimulant in the world (9). In 2020-2021, around 166.63 million 60 kilogram bags of coffee were consumed worldwide, a slight increase from 164 million bags in the previous year (10). The popularity of the tea and coffee culture across the globe has amplified over the years, making them the most consumed caffeinated beverages in the world. This is probably not only driven by taste, but also because of its property as a stimulant. Approximately, 2 billion cups of coffee are consumed on a daily basis in the world (11).

4.3 Caffeine and Dependence:

The concern regarding the rampant consumption of caffeinated beverages was central to the debate around inclusion of caffeine withdrawal in the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) (3).*"Caffeine Withdrawal and Dependence: A Convenience Survey Among Addiction Professionals"* published in 2013, concludes that the majority of addiction professionals believe that caffeine withdrawal and dependence disorders exist and are clinically important. However, these professionals were divided on whether caffeine withdrawal and dependence should be included in DSM. Presently caffeine withdrawal is included in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-V).

Energy drinks have also gained popularity over the years, especially among adolescents and young adults. In some countries, the regulation of these drinks is not stringent enough, leading to their aggressive marketing. Energy drinks are appealing to young adults due to their ability to enhance performance and their stimulant effects. There have been increasing reports of caffeine intoxication from energy drinks (12) despite the subtle warning "contains caffeine" on their label to ensure public awareness. The popular drink 'Red Bull' carries a label clearly stating "consume not more than 500ml per day", which is equivalent to two cans of this energy drink. Statutory warnings on the labels of energy drinks clearly suggests that consumption of large doses of caffeine are detrimental to health. However, an increasing trend of consumption continues despite these warnings.

4.4 Caffeine and Sleep:

Sleep is largely affected by caffeine consumption via its effects on adenosine, an inhibitory neurotransmitter that promotes sleep and suppresses arousal under normal circumstances. However, caffeine, being an adenosine receptor antagonist, inhibits sleep. The half life of caffeine is approximately 5 to 6 hours, indicating that large parts of caffeine are not eliminated from the body if consumed in the latter half of the day. Sweeney MM et al,

in their study on caffeine use disorder, stated that caffeine is associated with caffeine-related functional impairment, poorer sleep, greater depression, anxiety, and stress (13).

This is further corroborated by the study by Goel N et al, where they demonstrated a correlation between sleep deprivation and cognitive function, attentiveness and alertness (14). Additionally, Bonnet MH et al observed a significant reduction in daytime objective alertness in subjects that were subjected to even ninety minutes of sleep deprivation for one night (15). This alteration in behaviour adds fuel to fire, further increasing the magnitude of dependence and sleep disruption through the vicious cycle of caffeine consumption -> sleep deprivation -> poor attentiveness -> caffeine consumption.

V. CONCLUSION

The rapidly increasing casual caffeine culture deserves more serious consideration. From dependence to sleep disorders, caffeine consumption has a tremendous impact on our health, both physical and mental. It's perceived 'benign' nature makes its consumption more acceptable to society. Caffeinated drinks are not as harmless as recognised by most, and need to be consumed with caution.

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Table 1 : Proxy Questions for DSM IV Criteria

DSM IV Criteria	Proxy Question
Withdrawal	I experience uneasiness, lack of energy, headaches or irritability when I do not consume this beverage(s) ● Yes ● No ● Not Applicable

Used larger amounts/longer	Since I started consuming this beverage regularly, my consumption has : ● Reduced ● Remained the same ● Increased ● Not Applicable
Repeated attempts to quit/control use	I have tried / am trying to take a break from consuming this beverage(s). ● Yes ● No ● Not Applicable
Physical/psychological problems related to use	Do you have any of the following on most days? : ● Problems falling asleep ● Disturbed sleep ● Wake up feeling exhausted ● None of the above

Table 2 : Results of the Survey

Category	**Results**
Age (in years)	
Median	45
Range	12 - 68
Gender	
Males	35.9 %
Females	64.1 %
Impact of the beverages on a person's body	
Beneficial	
Of consequence	38 %
Harmful	42.2 %
Not applicable	12 %
	7.8 %
Consumption over time	
Reduced	16.7 %
Remained the same	59.4 %
Increased	12.5 %
Not Applicable	11.5 %
Experience of withdrawal symptoms (lack of energy, headaches, uneasiness)	
Yes	
No	34.4 %
Not Applicable	56.8 %
	8.9 %
Attempts to quit	
Yes	25.7 %
No	63.9 %
Not Applicable	10.5 %
Sleep	
Problems falling asleep	19.8 %
Disturbed sleep	27.1 %
Waking up feeling exhausted	18.8 %
None of the above	58.3 %

Figure 1 : Distribution of Daily Total Caffeine Intake (mg)