

Behaviour of Students of Senior Secondary School towards Caffeine in Western Uttar Pradesh, India

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ABSTRACT

Introduction: On entering 11th and 12th standard students feels a load of studies and lack of energy to combat that, an increase in caffeine consumption is observed in students which have both short and long term side-effects.

Aim: This study has been undertaken to throw light on the unspoken side of the coin called caffeine consumption by students of senior secondary school to relieve stress.

Materials and Methods: This was an observational study done over a period of six weeks from 1st September to 15th October 2021. Data was collected from senior secondary schools of western Uttar Pradesh, India, via semistructured questionnaire which was followed by the audio-visual presentation about

caffeine. After one week of presentation same questionnaire was distributed and change was evaluated and compiled in form of adequate tables to study the responses. Data were entered in an MS Excel and tabulated in form of tables.

Results: Out of 1000 students, 920 (92%) students knew caffeine, among whom 500 (50%) students knew the side-effects of caffeine. A total of 780 (78%) students had a perception that caffeine is addictive. Among the reasons for caffeine consumption, to ward away sleep (51%) was the most prominent. Coffee was the most consumed caffeinated product (61%).

Conclusion: From the present study, it be concluded that there is a lack of knowledge in students about caffeine intake and its side-effects which can affect their health.

Keywords: 11th and 12th standard, Coffee, Harmful effect, Health

INTRODUCTION

When students enter the 11th standard there is a lot of pressure on them regarding their careers. Regardless of the stream they chose, they are just concerned about the upcoming competitive exams and their board exams. They need to attend long coaching hours after school and late-night studies leading to a very hectic lifestyle to overcome their energy deficiency they start consuming a lot of caffeine unaware of the harmful effects and dangerous signs. Caffeine is a pharmacologically active substance which is both used and abused worldwide. It is present in many different products such as tea, coffee, soft drink, and energy drinks. Caffeine consumption is popular among people because of its unique ability to enhance mood and alertness, increase exercise capacity, to increase wakefulness and mental alertness [1]. Students are not even aware that some of the products they are consuming contain caffeine. One major question is what actually is caffeine? Sixty plant species produce caffeine as xanthine alkaloid. Cocoa beans, kola nuts, tea leaves, and coffee beans are most famous ones. Some other example of these species is Yerba mate and gharana berries [2].

Apart from coffee and tea, dark chocolates, soft drinks, soda, milk chocolate, energy drinks, energy bars, green tea, weight loss pills, etc., also contain a considerable amount of caffeine [2]. Consumption of these products without knowing about the amount of caffeine in these products can lead to side-effects. The side-effects mentioned in Diagnostic and Statistical Manual of Mental Disorder (DSM-5) includes nervousness, insomnia, restlessness, excitement, diuresis, gastrointestinal disturbance, jitters, psychomotor agitation and tachycardia [3]. During childhood and adolescence, the brain undergoes intensive development, especially those centres which are responsible for the performance, planning and emotional control, where frequent caffeine consumption by these groups may have adverse health impacts. When consumed in adequate amount (20-200 mg/day) caffeine produces favourable effects like alertness, increase in energy, low fatigability, improvement in behavioural and cognitive function but if consumed at a higher dose (>200 mg/day) it can cause undesired effects like anxiety, gastrointestinal

disturbances, jitters, tremors, tachycardia and psychomotor agitation [4]. The over and influential advertising of these caffeinated products and their easy accessibility in market has made them acceptable and readily available for all age groups in a population. Caffeine can also show synergistic effects with other substances and reinforce as unhealthy behaviour for example caffeine in sugar drinks can lead to obesity and other lifestyle-related disorders, caffeine show neurobiological effects which stimulates the relaxing effect of nicotine leading to increase consumption of both caffeine and tobacco. Food and Drug Administration (FDA) classify caffeine as generally safe and according to them, the toxic dose is >10 g/day for an adult [5]. Pure powder form of caffeine is also available in market as a dietary supplement which is life threatening even in a table spoon amount [5]. Caffeine has ability to produce physiological effects which are produced by any drug of dependence, it also shows potential of tolerance, withdrawal and dependence so all these points makes caffeine to fit into the criteria of addictive substances. Therefore, everyone should be careful and aware of what they are consuming.

The study was conducted to evaluate the knowledge and behaviour of students of 11th and 12th standards of Indian schools regarding the consumption of caffeinated products. This knowledge is important for both short and long-term health-related effects. Students should be aware that what they are consuming contains what and how can it affect their health.

MATERIALS AND METHODS

The present study was an observational study, conducted over a period of six weeks from 1st September to 15th October 2021. Before starting the study approval from the Institutional Ethical Committee (IEC) (ECA{EWINST/202111540}) of Subharti Medical College (SMC), Meerut, India, in accordance with the Helsinki Declaration of 1975, revised in 2000 was taken.

The study was conducted in senior secondary schools of western Uttar Pradesh, India, which were selected purposively because of the presence of an easily accessible school canteen that provides

caffeinated products. Also, as per general observation, most of the students belong to upper socio-economic classes which increase the probability of their caffeine consumption. For conducting the study on 1000 students of the 11th and 12th standard, a semi-structured questionnaire [Questionnaire] was used. The sample size was calculated using a 4PQ/L².

Inclusion criteria: Students of 11th and 12th class of western Uttar Pradesh, India and willing to participate were included in this study.

Exclusion criteria: Students below 11th class and unwilling to participate were excluded in this study.

Study Procedure

After taking informed consent from the participating students information was gathered on a semi-structured questionnaire by distributing them amongst the students assembled in the school library. Through the questionnaire, knowledge was gained on their current knowledge and behaviour regarding the consumption of caffeinated products. It was followed by an audio-visual presentation about the side-effects, safe limit, addiction, health hazards of caffeine along with a list of non caffeinated products. Then after one week, the schools was visited again and the same questionnaire was distributed to the same students. The motive of the second round of questionnaires was to see the percentage change in their knowledge about caffeine.

STATISTICAL ANALYSIS

Data were entered in an MS Excel Sheet and tabulated in form of tables.

RESULTS

In [Table/Fig-1] socio-demographic characteristics of the study population is shown. A 21% of students were of 15 years of age, 57% were 16 years, and 22% were 17 years age. Amongst the students, 72% students were boys and 28% students were girls. Father of 47% students was professional, 33% were semi-professional, 16% were cleric/shop-owner/farmer and 4% were skilled worker by occupation. Socio-economic class according to modified Kuppaswamy socio-economic classification 2017 [6], 46% of students belonged to the upper class and 54% belonged to the upper-middle class. A total of 17% students were of commerce and 83% students were of science stream. A 22% of students were in 11th standard and 78% students were in 12th standard.

Socio-demographic characteristics		No. (%)
Age (years)	15	210 (21)
	16	570 (57)
	17	220 (22)
Gender	Girls	280 (28)
	Boys	720 (72)
Father's occupation	Profession	470 (47)
	Semi-profession	330 (33)
	Clerical, shop-owner, farmer	160 (16)
	Skilled worker	40 (4)
Socio-economic class	Upper	460 (46)
	Upper-middle	540 (54)
Stream	Commerce	170 (17)
	Science	830 (83)
Class	11 th class	220 (22)
	12 th class	780 (78)

[Table/Fig-1]: Distribution of study population according to socio-demographic characteristics.

The [Table/Fig-2] shows the association between students who knew about caffeine before and after the audio-visual presentation. There was an increase of 8% in the knowledge of students regarding caffeine after the presentation.

Knowledge	Pre	Post	Change
Yes	920 (92%)	1000 (100%)	↑8%
No	80 (8%)	0 (0%)	↓8%

[Table/Fig-2]: Knowledge about caffeine.

The [Table/Fig-3] shows the association between students' knowledge about individual side-effects of caffeine before and after the audio-visual presentation. About 780 (78%) students had a perception that caffeine is addictive. There was an increase of 13% in the knowledge of addiction, a decrease of 4% in the knowledge of caffeine being carcinogenic, and an increase of 8% in the knowledge of caffeine affecting Central Nervous System (CNS), after the presentation.

Side-effects	Pre (n=500)	Post (n=820)	Change
Addiction	160 (32%)	370 (45%)	↑13%
Carcinogenic	80 (16%)	100 (12%)	↓4%
Effect on CNS	120 (24%)	260 (32%)	↑8%
No response	140 (28%)	90 (11%)	↓17%

[Table/Fig-3]: Knowledge about individual side-effects (multiple responses).

The [Table/Fig-4] shows the association between the knowledge of students about products containing caffeine before and after the audio-visual presentation. There was an increase of 26% in the knowledge of students regarding products containing caffeine after the presentation.

Knowledge	Pre	Post	Change
Yes	600 (60%)	860 (86%)	↑26%
No	400 (40%)	140 (14%)	↓26%

[Table/Fig-4]: Knowledge about products containing caffeine.

The [Table/Fig-5] shows the distribution of students of the study group according to caffeine consumption. Amongst the students, 51% said that they consume caffeine to ward away sleep, 24% for enhancing taste, 23% for increasing concentration, 13% for driving long distances, 12% to cure headaches, and 4% to decrease the effect of alcohol and before the workout.

Reasons	No. (%)
To ward away sleep	510 (51)
Increase concentration	230 (23)
Decrease the effect of alcohol	40 (4)
For enhancing taste	240 (24)
For driving long distance	130 (13)
Before workout	40 (4)
To cure headache	120 (12)
No response	230 (23)

[Table/Fig-5]: Reason for caffeine consumption (multiple responses).

The [Table/Fig-6] shows the distribution of students according to most common problems faced by students after consuming caffeine. After consuming caffeine 20% experience racing thoughts, 15% gastrointestinal disturbance 10% insomnia, 8% nervousness, and 6% jitters.

Symptoms	No. (%)
Gastrointestinal disturbance	150 (15)
Insomnia	100 (10)
Nervousness	80 (8)
Jitters	60 (6)
Racing thoughts	200 (20)
No response	410 (41)
Total	1000 (100)

[Table/Fig-6]: Most common problems after consuming caffeine.

DISCUSSION

In present study group, it was observed that 21% of the participating students were of 15 years of age, 57% were of 16 years of age, 22% were 17 years of age, similarly Gera M et al., showed that majority of age group was 21% in 15 years of age [7]. In the present study, there was a male preponderance with 72% and 28% of female students while in the study by Ahmad M et al., male to female number was a bit higher with 75% males and 45% were females [8]. In present study, conducted on school students of 11th and 12th standard where 17% were from commerce stream and 83% were from science stream while Ahmad M et al., in their study found that the ratio was equal in both the streams i.e., 50% from science and 50% from commerce which was inconsistent with the results of present study [8].

In the present study, it was observed that among all the students 51% students consumed caffeine to ward away sleep, 23% to increase concentration, 4% to decrease the effect of alcohol and boost workout, 24% to enhance taste, 13% for aiding to drive long distances, 12% to cure headache, 23% did not have any reason. While Ahmad M et al., in their study found that 38.7% of students consumed caffeine to ward off sleep which was lower than present study, 33% used caffeine to increase concentration which was higher as compared to present study and 7.9% said that caffeine helped in memorising their subjects [8]. In present study, common problems faced by students were- GI disturbances, insomnia, nervousness, jitters, racing thoughts whereas Evans MS et al., in their study found that the common problems after consuming caffeine were feeling of anxiety, nausea, jitteriness, nervousness, restlessness, insomnia, GI disturbances, tremors, tachycardia [9].

Limitation(s)

This study only includes students of senior secondary school. Only change in knowledge about caffeine was evaluated after an audio-visual presentation.

CONCLUSION(S)

From this study, it can be concluded that students are lacking in knowledge about caffeine and caffeinated products. Due to which there is irrational consumption of caffeinated products. Caffeine is the new alcohol of youngsters as there is no as such 'restriction on consuming it and it is slowly becoming a part of student's lifestyle with its harmful effects. So, students need to realise that they should be aware of what they are consuming. Students should learn how to limit their caffeine intake otherwise they have to face health issues. Proper consoling is necessary for parents, students and teachers.

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QUESTIONNAIRE

Socio-demographic

1. Age :
 - Before work outs
2. Father's education:
 - To cure headache
3. Father's occupation:
 - Other
4. Monthly income:
5. Gender-
 - Yes
 - No
6. Address:
7. Stream:
 - Commerce
 - Science
 - Arts
8. Class-
 - 11th class
 - 12th class
9. Do you know what caffeine is?
 - Yes
 - No
10. Do you know about the side-effects of caffeine?
 - Yes
 - No
11. If yes enumerate
11. Do you know of products commonly containing caffeine?
 - Yes
 - No
12. If yes enumerate
12. Do you know about the safe limit of caffeine consumption per day?
 - Yes
 - No
13. If yes enumerate
13. Do you know excessive intake of caffeine can cause deadly diseases?
 - Yes
 - No
14. If yes enumerate
14. Do you think it is addictive?
 - Yes
 - No
- 15.
16. How according to you is caffeine for health?
 - Not harmful.
 - Good
 - Harmful to some extend
16. Why do you consume caffeine? (Multiple options allowed)
 - To ward away sleep
 - Increase concentration
 - Decrease the effect of alcohol
 - For enhancing taste
 - For driving long distances
17. If given a choice what would you prefer-
 - Caffeinated products
 - Non caffeinated products (e.g.,-green tea, coconut water, fruit juices etc.,)
 - Caffeine within safe limits
18. Do you feel your caffeine consumption has increased after entering 11th/12th standard?
 - Yes
 - No
 - May be
19. On a scale 1-5 how do you rate your dependence on caffeine per day (1-lowest 5-highest)

1	2	3	4	5
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20. In what form do you consume caffeine? (Multiple options applicable)
 - Coffee (specify type)
 - Tea (specify type)
 - Chocolate (specify type)
 - Cold drinks
 - Energy drinks
 - Energy bar
 - Weight loss pills
 - Pain relievers
21. Are there times of the day when you consume more caffeine
 - Yes
 - No
 - If yes when
22. Do you consume more caffeine when you are in someone's company
 - Yes
 - No
 - Not sure
23. Where do you mostly consume coffee/tea?
 - At home
 - At café
 - Other
24. What is your average weekly expenditure on caffeine containing products? (In rupees)
 - 100-300
 - 300-500
 - above 500
25. Do you consume caffeinated product together with other products?
 - Yes
 - No
26. If yes specify
26. How often do you experience the following symptoms after consuming caffeine? (Multiple options allowed)
 - G.I disturbances

- Insomnia
 - Nervousness
 - Jitters
 - Racing thoughts
27. Specify the frequency -
- Very often
 - Seldom
 - Never
27. At what age did you start consuming caffeine?
28. Have you tried limiting/stopping your caffeine intake?
- Yes
 - No
29. Have you experienced any of the following symptoms on limiting/stopping caffeine intake? (Multiple options allowed)
- Headache
 - Drowsiness
 - Fatigue
 - Nausea
 - Anxiety
 - Depression
 - Cramps
 - Flu like symptoms (fever, sore throat, loss of appetite etc.)
 - Altered hand steadiness
30. Specify the frequency
- Very often
 - Seldom
 - Never
30. Did you start consuming caffeine again after the appearance of the above symptoms?
- Yes
 - No
31. Does caffeine affect your sleeping habits?
- Yes
 - No
32. Do your parents restrict your caffeine intake?
- Strictly
 - Only for excessive intake
 - Not at all
33. What encourages you to buy caffeinated products?
- Price
 - Advertisement
 - Availability
 - Popularity
 - Brand name
34. Do you want to limit/stop your caffeine intake?
- Yes
 - No
35. If yes specify the reason: