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KNOWLEDGE AND TRENDS OF CAFFEINE CONSUMPTION AMONG MEDICAL AND NON MEDICAL STUDENTS OF LAHORE PAKISTAN

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OBJECTIVES: To determine the rate of the caffeine consumption among students and to assess side effects and benefits of the caffeine among medical and non-medical students. **METHODOLOGY:** This cross-sectional study was included medical and non-medical students of various institutes of Lahore. The study duration was three months from May 2014 to July 2014. A predesigned structured questionnaire was used to collect data from the students, Consent was obtained on the form beforehand. **RESULTS:** Astonishingly 98.6%(74) of medical and 97.4%(73) of the Non-Medical students said that they consume caffeine in one form or another, the most popular caffeinated product turned out to be soft drinks (39%/126 responses) followed by Tea (26.5%/86 responses), coffee (20.6%/67 responses) and Energy drinks (11.2%/36 Responses), other caffeinated tablets and gums etc. were consumed by 4.8% of the cases. Almost 25.7%(73 responses) of the students said that they consumed caffeine while studying for exams and 20%(58 Responses) consume it when they have a headache, 19%(54 responses) when they are out with friends, 9.5%(27) when driving for long distances, 9.9%(28) while at work, 18.5%(25) consumed it when they didn't get enough sleep, 60%(90) of the student select a specific caffeine product because of its taste, 8.7%(13) on the basis of affordability and price, 6.7%(10) on the basis of amount of caffeine, and 5.3%(8) on the basis of quality, 11%(17) had no special preference. Almost 44.7%(67) students consumed 0-1 caffeine product per day, 44%(66) consumed 2-3 products per day, 7.3%(11) consumed 3-5 products per day and 2%(3) consumed 5 or more. 62%(93) of students said that their caffeine consumption has increased since they entered the college or university due to increased study load as the main reason (45.3%) also peer pressure was a significant cause (11.3%). As far as knowledge was concerned, 46%(35) of medical students were categorized as having high knowledge of caffeine. Whereas 25%(19) of non-medical students were categorized as having high knowledge about caffeine. **CONCLUSION:** Most Students consume more caffeine during exams and other periods of strenuous activities and most of them do not think that caffeine can be addictive. The Percentage of medical and non-medical students consuming caffeine is 98.6 and 97.3 percent respectively. Most popular product is soft drinks and cause of increase consumption is increased academic burden. **KEY WORDS:** Caffeine, CNS Stimulants, Methyl xanthine, Medical students, Peer Pressure, Soft Drinks

INTRODUCTION

Over 120000 tons of caffeine is consumed per year globally, that amounts to 70mg per inhabitant per day. There have been more than 19,000 studies on caffeine and coffee in the past 30 years, most of which have aimed to uncover the drug's exact effects on the human body¹⁰ Caffeine is used by more than 80% of the world's population. Caffeine is a central nervous system stimulant belonging to the group of xanthines¹. Approximately 90% of the caffeine contained in a cup of coffee is cleared from the stomach within 20 minutes after oral ingestion, with its effects commencing within an hour and lasting for three to four hours².

The widespread use of caffeine may be due to the fact that its habitual consumption has been significantly related to increased self-reported alertness,

improved performance of vigilance tasks and fewer lapses of attention, improved long-term memory and faster locomotor speed^{3,4}. Caffeine reduces fatigue, therefore improving performance on tasks like driving, homework, and playing sports⁹. Studies have also suggested that caffeine is beneficial in treating asthma and preventing cavities¹⁰.

The effects of caffeine on the circulatory system include direct myocardial stimulation (resulting in tachycardia, increased cardiac output, ectopic beats and palpitations), increased respiratory rate, and increased gastric secretion which may lead to gastric and relaxation of the smooth muscles, all of which are regarded to be adverse side-effects of caffeine⁵. Consuming more than 500 to 600 milligrams a day may cause insomnia, nervousness, restlessness, and muscle tremors¹³.

Typically, the onset of withdrawal symptoms occurs 12 to 24 hours after abstinence, with peak intensity at 20 to 51 hours. Withdrawal symptoms, including headaches, fatigue, decreased energy/physical activity, decreased alertness, drowsiness, decreased contentedness, depressed mood, difficulty in concentrating, irritability and clouded mentality, have been reported, and may last for two to nine days⁶.

Caffeine intake, no doubt, is one the most important parts of a student's daily life at universities and colleges of our country (Pakistan) as well as internationally. Tertiary education often necessitates students to study for extended periods of time, especially at times of increased workloads such as prior to tests or examinations. There is an increased demand of caffeine in the form of Energy drinks, coffee, tea, and Pepsi and other soft drinks as students try to either cope with the increasing academic pressure or as they try to adjust with increasing peer pressure or as they try to be more social, such beverages can be seen in the hands of students as they move around campuses or attend lectures. Complete non-users of caffeine may therefore be close to non-existent^{2,7,8}.

The students have a wide assortment of choices available as to decide the form of caffeine they want to use, like tea, coffee, soft drinks, energy drinks, even caffeine tablets. Such companies especially market their products to young generation i.e. our students. Therefore, a need to determine the use of caffeine by students, particularly for 'academic purposes', and their knowledge of its benefits, side-effects and withdrawal symptoms was identified.

Although widely popular among the majority of people around the world, caffeine intake has been linked to a variety of health issues, both short and long term. Although moderate caffeine intake is not harmful to the majority of adults, too much can lead to some unpleasant effects. Caffeine, or trimethylxanthine¹⁰, is an analeptic, meaning that it stimulates the central nervous system, and ergogenic, meaning that it improves physical performance. It is also a diuretic, meaning that it causes dehydration⁹.

In contrast to the many perceived disadvantages of consuming caffeine, there are also many advantages. For most healthy adults, consuming moderate doses of caffeine, or about 200 to 300 milligrams per day is not harmful¹¹. After decades of testing, caffeine remains on the FDA's list of food additives that are "generally recognized as safe"⁹.

So it is safe to assume that caffeine is in fact not directly related to any disease and is thus if used in

moderate quantities is actually beneficial, and may actually help students.

Rationale:

Caffeine is one of the most commonly consumed substance on earth and finding out its usage among students is of paramount importance as its injudicious use could have serious health implications and thus finding out the reasons of its consumption and other general trends of consumptions could help us in implementing guidelines to limit the caffeine use among this important demographic.

Objectives:

This Study focused on the opinions of students regarding different types of beverages and which one they use and why, we also covered the frequency of intake, knowledge regarding its effect and overall impact of caffeine in their lives let it be medical or social or academic.

MATERIALS AND METHODS

Study design

Cross sectional study.

Setting and Population

Medical student selected from
1-Services Institute of Medical sciences, Lahore.
2-FMH Medical College, Lahore.

Non-medical students selected from
1-Punjab University, Lahore.
2-National college of Arts, Lahore.

Duration of Study

Study duration was three 3 months from May 2016 to July 2014.

Sample Size and technique

150 students were selected. Stratified sampling technique was applied to divide the population into two equal parts medical and non-medical and then simple convenient random sampling technique was applied on each strata so that number of medical students selected are equal to number of non-medical students.

Confidence level (1- α) = 95%, Precision required (p) = 0.05, Sample size determined by WHO software info2000, provided by CPSP.

Inclusion Criteria

Medical and non-Medical student from the above named institutes.

EXCLUSION CRITERIA

- Un-willing Students
- Close friends of the researchers

Data collection

Total 150 subjects were included. The information is collected through a preformed questionnaire (Annexure-2) by us. The purpose of the study was explained to the subjects under study and written consent was taken. The questionnaire comprised of two portions. First portion contained identification data and the second portion contained study variables.. To calculate the knowledge a specially designed scale was used having maximum score of 5 and consisting of 5 questions from the questionnaire. (Annexure 3).

DATA ANALYSIS

Data was entered and analyzed through SPSS version 16.

The frequencies will be tested for statistical significance and Chi Square Test will be applied on qualitative outcome and a P value of 0.05 or less will be taken as Significant.

Ethical Clearance

Research was conducted according to the principles of the Declaration of Helsinki., consent was also be taken from each participant on a form. (Annexure 1).

RESULTS

Data from 150 participants was collected and 75(30 male and 45 female) were medical and 75(36male, 39 female) were non-medical, overall 56 % (84) of the population were female and 44 % (66) weremale. Most of the Participants belonged to age group of 17-32years.

According to the results obtained, astonishingly 98.6 % (74) of medical and 97.4 % (73) of the Non-Medical students said that they consume caffeine in one form or another. Overall 97.6 % (82) of female and 98.4% (65) of male population were using caffeine.

The most popular caffeinated product turned out to be soft drinks (39%/126 responses) followed by Tea (26.5%/86 responses), coffee (20.6%/67 responses) and Energy drinks (11.2%/36 Responses), Almost 25.7%(73 responses) of the students said that they consumed caffeine while studying for exams and 20%(58 Responses) consume it when they have a headache, 19%(54 responses) when they are out with friends, 9.5%(27) when driving for long distances,9.9%(28) while at work,18.5%(25) consumed it when they didn't get enough sleep,60%(90) of the student select a specific caffeine product because of its taste, 8.7%(13) on the basis of affordability and price, 6.7%(10) on the basis of amount of caffeine, and 5.3%(8) on the basis of quality, 11%(17) had no special preference. Almost 44.7%(67) students consumed 0-1 caffeine product per day, 44%(66) consumed 2-3products per day, 7.3%(11) consumed 3-5 products per day and 2%(3) consumed 5 or more.

Overall 62%(93) of students said that their caffeine consumption has increased since they entered the college or university due to increased study load as the main reason(45.3%/68), peer pressure was a 2nd significant cause(11.3%/17) of this increased consumption. Whereas 66%(50) of the medical students and 57%(43) of non-medical students said that their caffeine production has increased since they entered the university.66%(99) of the total students said that they take more caffeinated products during exams season, whereas 76%(57) of the medical students and 57.3%(43) of non-medical students said that they take more caffeine while preparing for exams. With 38.7% students saying that it allows them to have more study hours, whereas 27.9% using caffeine as sleep substitute, and 33% experience increase concentration time and 7.9% found it easier to memorize. Overall 32 % (48) said that they cannot imagine life withoutCaffeine and 30 % (45) consider themselves to be a caffeine addict and 26.7 % (40) said that they cannot go 24-48hours without caffeine.

Statistical analysis

Although we can see that there is some variation in the data collected, such as medical students apparently have higher knowledge of caffeine about its benefits and side effects, but statistically, this research with current sample size is unable to show any significant difference among the medical and non-medical students in any of the tested and compared variables. (P > .

For assessing the knowledge of students regarding caffeine, questions regarding effects of the caffeine that were asked in questionnaire were used and participants were given 1 marks for giving correct answer or selecting correct effect of caffeine on body, and 0 marks for selecting wrong option, in this way special grading scale was designed that had maximum marks of 5 and lowest 0.(annexure 3) And students were graded as follows

5	High knowledge about caffeine
4	Moderate knowledge about caffeine
3 or less	Low level of knowledge about caffeine

Table 1: Cross table showing Response of medical and non-medical students

Do you consume caffeine in any form?	Medical student n (%)	Non-Medical Students n (%)	p value
Yes	74(98.6 %)	73(97.4 %)	1.00
No	1(1.4%)	2(2.4%)	>0.05
Type Consumed			
Soft drink	26(34.6%)	33(44%)	>0.05
Tea	22(29.3%)	18(24%)	>0.05
Coffee	15(20%)	16(20.7%)	>0.05
Energy drinks	11(14.6%)	6(8%)	>0.05
Tablets/misc.	1(1.3%)	2(2.6%)	>0.05
No of Caffeinated products consumed in a day			
No consumption	1(1%)	2(2.6%)	>0.05
0-1	36(48%)	31(41%)	0.05
2-3	31(41%)	35(46%)	>0.05
3-5	4(5%)	7(9%)	>0.05
5>	3(4%)	0	>0.05

Table 2: Showing frequency (n) and Percentage of the students consuming caffeine for various reasons, response to self-evaluation questions and knowledge of students regarding caffeine

Reasons	Responses	
	Frequency	Percent
Studying for exams	73	25.7%
Driving long distances	27	9.5%
when you have a headache	58	20.4%
Exercise/Playing sports	17	6.0%
out with friends	54	27
When you didn't get enough sleep	27	9.5%
At work	28	9.9%
Total	284	100.0%
2-Self-evaluation Questions	Yes (n)	Percentage
Do you consider yourself a caffeine addict?	47	31.3
Can you go 24-48hours without caffeine?	110	77.3
Can you imagine life without caffeine?	102	68.0
3-Knowledge level	Frequency	Percentage
High Knowledge	54	36%
Moderate Knowledge	66	44%
Low Knowledge	30	20%

Table 3- showing the comparison between medical and non-medical students regarding the reasons of increased caffeine consumption upon entering the university and why student increase their caffeine consumption while studying

Students	No Increase	Increase study load	Peer Pressure	Popularity	Health benefits	Others
Medical	25(16.7)	39(26%)	7(4.7%)	1(0.7%)	2(1.3)	1(0.7)
Non-Medical	30(36.7)	29(19.3)	10(6.7%)	4(2.7%)	2(1.3%)	1(0.7%)

Why student increase their caffeine consumption while studying?	Responses	
	n	Percent
Increased study hours	54	38.6%
help to memorize text	11	7.9%
Leads to Improvement in grades	2	1.4%
Improves concentration time	34	24.3%
Sleep substitute	39	27.9%

Figure2-Bar Chart showing Comparison between medical and non-medical students for reasons of consumption of specific form of caffeine in Percentage

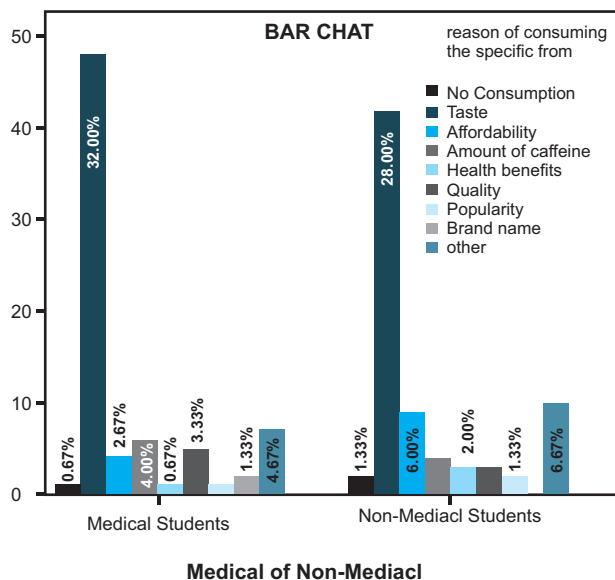
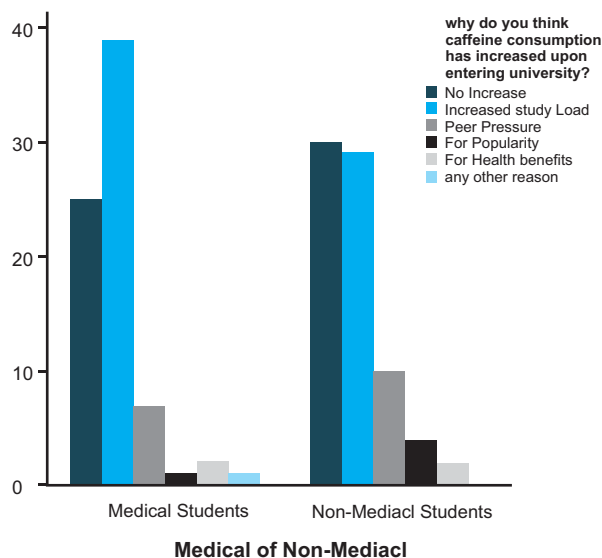


Figure4-Bar chart showing the comparison between medical and non-medical students regarding the reason of increased caffeine consumption upon entering the university



4. DISCUSSION

According to our research an astonishing 98% of the students of institutes of Lahore admitted to taking caffeine on a daily basis, this is a very high and significant number, considering that according to sources, overall 80% of the world population

regularly uses caffeine, and according to a research conducted at university of New Hampshire 74.93 percent of their students consumed caffeine¹³, In an another research named 'Medical students' use of caffeine for 'academic purposes' and their knowledge of its benefits, side-effects and withdrawal symptoms', it was found that 94% of the medical students consumed caffeine¹². This rate in our medical students is 98.7% almost the same.

Whereas 66% of the medical students and 57% of non-medical students said that their caffeine production has increased since they entered the university, so medical students are consuming more amount of caffeine as compared to non-medical students. This could be attributed to the fact that medical students lead a more stressful academic life, they have to attend hectic wards and lectures, and their curriculum demands that they always stay active and receptive so they resort to taking caffeine to give themselves a boost, non-medical students are also consuming a very high amount probably due to same reasons.

We also found out that Pakistan is the 7th largest Tea consumer in the world, but it is not as popular as soft drinks among students, also coffee though becoming popular, it is not as much popular as we would expect from other studies conducted in west, such as in university of new Hampshire. The reason could be the cultural differences as well as the price, since coffee is relatively pricy as compare to other alternatives.

Participants found caffeine to be advantageous for its effects on staying awake, getting good grades, increased study hours, being able to focus, being better able to socialize as evident from the data given in the results, this could be due to the fact that caffeine does have some beneficial CNS stimulatory effects, and some students use it as sleep substitute (27.9%). This perception has been proven incorrect by studies: caffeine has no net restorative effects when performance and mood are impaired by sleep deprivation¹².

to non-medical students, they don't consider

themselves to be a caffeine addict as compared to non-medical students. This could be attributed to the fact that medical students have more knowledge about caffeine and its effects and know that caffeine is not very addicting and though there are withdrawal effects, they are not as severe as other more serious drugs like cocaine and heroin.

Not surprisingly, medical students had better knowledge about caffeine as compared to non-medical students, this could be due to the fact that they have studied about it in their books

CONCLUSION

Our students are consuming caffeine daily and it has become a part of their daily lives, this trend is almost the same in both medical and non-medical students and we conclude that the major factors causing this trend is the increased study load, as well peer pressure and the pressure to fit in and socialize with their peers, and the fact that caffeine helps them to stay more active and alleviate headaches.

Medical students have better knowledge of caffeine as compared to non-medical students, overall 20% of students have low knowledge about caffeine so they are consuming caffeine but have no idea about what it can do to them and what effects could caffeine have.

Widespread use of electronic and social media is needed to remove misconceptions regarding effects of caffeine and to prevent its injudicious use among students, more over strategies must be devised to lessen the academic burden on students so that they won't have to resort to caffeine to keep up with their peers.

Moreover, more and bigger studies are also needed that cover wider and more diverse demographics so that results can be extrapolated to general population and thus data can be used to health policy and planning.

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Author's contribution:

Mubashir Ahmad; concept, study design, data collection, data analysis, manuscript writing, manuscript review
Rashk e Hina; data collection, data analysis, manuscript writing, manuscript review
Ahmad Tayyab; data collection, data analysis, manuscript writing, manuscript review