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The Effects of Caffeinated Beverage Consumption on the Sleep Habits and Lifestyle of Medical Students in Public and Private Medical Universities in Karachi, Pakistan

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Objectives: To determine the effects of caffeine consumption on the sleep habits and lifestyle of medical students.

Methods: A cross-sectional study was conducted at Jinnah Sindh Medical University (JSMU) and Hamdard College of Medicine. On 422 undergraduate students aged 18-25 years, through random sampling. The duration of the study was from January 2019 to June 2019. The data was collected through self-administered questionnaire which included data regarding sleep habits and lifestyle of medical students.

Results: Majority (81.6%) of the students consumed caffeine while only (18.4%) did not. One third of the participants (31.8%) reported caffeine consumption increased their academic performance and (57.3%) reported that it does not. More than half of the participants (63.3%) who consumed caffeine slept during class, whereas (47.2%) never had difficulty in falling asleep during the night.

Conclusion: This research concluded that caffeine does have some role on sleep habits of medical students as they tend to have less sleep hours, experience day time dysfunction, average quality of sleep, and falling asleep during class. It has been concluded that caffeine has no effect on eating habits of medical students however, it does increase the screening time, keeping them active.

Keywords: caffeine, sleep habits, lifestyle, medical students, universities.

IRB: Approved by Institutional Review board, Jinnah Sindh Medical university.

INTRODUCTION:

Sleep is known to have a significant role in a person's body function, as it regulates hormone release and has effects on daytime functioning, cardiovascular activity, endocrine and nervous systems [(1)]. Sleep is physiologically significant for a sound mind and body. There are several adverse health conditions associated with poor sleep quality. The commonly experienced effects of sleep related problems are easy fatigability, daytime sleepiness and decreased ability to perform day tasks [(4)]. Poor sleep is associated with increased risk of hypertension, stroke, diabetes and increase in BMI among college students who are mostly young adults [(4-5)].

Poor sleep quality is prevalent nowadays and is associated with cognitive decline, impaired health and reduced quality of life [(6)]. Poor sleep quality is associated with excessive daytime sleepiness, defined as having increased propensity to fall asleep unintentionally during daytime [(7)]. Universities going medical students are more likely to have poor sleep quality due to irregular daytime routines, exam periods, use of caffeinated drinks, and use of technologies like mobile phones or television late at night [(8)].Majority of the students are suffering from various sleep problems with insomnia being very common. Other sleep related problems that the students suffer from are snoring, sleep apnea, sleep deprivation, sleep paralysis.

Most of the medical students are sleep deprived to compensate the hours of study [(1)]. Students rely on consumption of coffee/tea/beverages with caffeine to stay awake and fresh decreasing the desire to sleep. Excessive use of caffeinated beverages has been seen to be implicated in this process [(2)]. Sleep deprivation usually results in fatigue, loss of concentration, daytime sleepiness. Sleep is also affected by the exercise [(3)]. More than 120000 tons of caffeine is consumed per year In United States [(9)]. Caffeine is used by 80% of the world's population. Caffeine is a psychoactive drug that stimulates the central nervous system.

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The ergogenic properties of caffeine also supplement the performance of athletes in physical games. The adverse effects of caffeine are headache, palpitations, anxiety and insomnia. More serious adverse effects include vomiting and abdominal pain, hypokalemia, hallucinations, seizures, arrhythmias and even death [10]. Caffeine dependence may develop among individuals who consume caffeine because of a need to counteract sleep inertia [1]. Along with sleep disruptive effects of caffeine it also enhances the performance of a medical student in academics [11]. The aim of the study is to determine the effects of caffeine consumption on the lifestyle and sleep habits of medical students of public and private medical universities in Karachi.

MATERIAL & METHODS

A cross-sectional survey was conducted in 2019, at one public (Jinnah Sindh Medical University) and one private medical university (Hamdard University) after the approval of IRB. The sample size was calculated through OpenEpi proportion sample size calculator, based on a study according to which, prevalence of energy drinks among medical students in DMC was 39% and in Aga Khan University was 51.9%. Keeping the anticipated frequency of 50% for life style and sleep habits and using 95% confidence interval with bound of error of 5%, sample size came out to be 384. However, considering wasting of 10% for statistical convenience we recruited 422 subjects. The data was collected through random sampling. Students aged 18-25 years, from first to final year MBBS studying in private and public medical universities were included. Students who were having any systemic diseases, taking any medication and females who were pregnant were excluded from the survey. The confidentiality and anonymity of the participants was strictly ensured. Informed consent was signed by all participants. Age, gender, year of education, physical activity, sleep habits were assessed using a standardized questionnaire. Lifestyle variables included are daily routine, total daily screen time, hobbies and physical activity level. Data will be analyzed using SPSS version 23. Mean and standard deviation were calculated for quantitative variables and frequency for categorical variables.

RESULTS:

Majority of the participants (79.4%) were females and (20.6%) were males. Nearly half were between 20-21 years old (44.3%) while (30.6%) were between 22-23 years of age. About (55.9%) belonged to public medical university and (44.1%) belonged to private medical university. Majority lived with their families (86.7%) while only a few resided in hostels (13.3%). (Table: 1)

Majority (88.6%) of the students consumed caffeine in any form while only (11.4%) of the students didn't consume caffeine at all. Almost half (43.4%) responded that they sleep between 11-1am followed by (39.8%) by 1-3am during college nights. During weekend (42.7%) sleep between 1-3am, however a significant low (4.3%) were seen to sleep at between 9-11pm. The duration of sleep of nearly half of the participants (46.9%) was less than 6 hours i.e. only (1.4%) were sleeping more than 8 hours. (28.9%) marked that they experienced daytime dysfunction once a week and (28.7%) said twice a week. About half of the population (55.2%) rated their sleep quality average, (16.6%) stated that they find it difficult to fall asleep during weekdays while another (16.6%) throughout the week.

On asking respondents how many times they wake up once they have fallen asleep, (33.9%) marked 1-3 times. Almost half (49.1%) found it hard to stay awake during university hours. About ⅓ i.e. (63.3%) population have fallen asleep during class while (47.2%) never had difficulty in falling asleep during night. (Table. 2)

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Table 1: Socio demographic characteristics of the study participants (n=422)	
Variables	%/n
GENDER	
Female	79.4% (335)
Male	20.6% (87)
AGE	
18-19	22% (93)
20-21	44.3% (187)
22-23	30.6% (129)
24-25	3.1% (13)
University	
Public medical university	55.9% (236)
Private Medical University	44.1% (186)
Year of education	
1st year	21.3% (90)
2nd year	13% (55)
3rd year	25.1% (106)
4th year	30.1% (127)
5th year	10.4% (44)
Living status	
Hostel	13.3% (56)
Family	86.7% (366)

Table 2: Sleep habits of the study participants (n=422)	
variables	%/n
Consume caffeine in any form	
Yes	88.6% (373)
No	11.4% (49)
When do you sleep during college nights	
9-11pm	7.3% (31)
11-1am	43.4% (183)
1am-3am	39.8% (168)
After 3am	9.5% (40)
When do you sleep during Weekends?	
9-11pm	4.3% (18)
11-1am	29.1% (123)
1am-3am	42.7% (180)
After 3am	23.9% (101)
Duration of sleep during college Nights?	
Less than 6hrs	46.9% (198)
6-7hrs	38.9% (164)
7-8hrs	12.8% (54)
More than 8hrs	1.4% (6)
Daytime dysfunction due to Sleepiness?	
Never	23.7% (100)
Once a week	28.9% (122)
Twice a week	28.7% (121)
Thrice or More in a week	18.7% (79)
Rate sleep quality	
Poor	15.4% (65)
Average	55.2% (233)
Good	29.4% (124)
Difficulty falling asleep at night	
During weekends	19.7% (83)
During weekdays	16.6% (70)
Never	47.2% (199)
Throughout the week	16.6% (70)
Once you have fallen asleep	
Don’t wake-up at night	64% (270)
Wake-up 1-3 Times	33.9% (143)
Wake-up more than 3 times	2.1% (9)
Is it hard for you to stay awake during university hours?	
Yes	49.1% (207)

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caffeine (n=422)	
Variable	%/n
Do you exercise Regularly?	
Yes	26.5% (112)
No	73.5% (310)
If you exercise?	
Less than 30mins per day	14% (59)
Less than 1 hour per day	8.3% (35)
1-2 hours per day	5% (21)
More	1.4%(6)
Caffeine affect your eating habits?	
Increases appetite	6.6% (28)
Decrease appetite	21.3% (90)
No change	52.4% (221)
No caffeine intake	19.7% (83)
What Is your total screen time?	
Less than 1 hour	4% (17)
1-2 hours	13.3% (56)
2-4 hours	27.5% (116)
More than 4 hours	55.2% (233)
Caffeine keeps you active? Yes	63.7% (269)
No	17.8% (75)
I don't drink	18.5% (78)
Participate in outdoor games?	
None	67.5% (285)
Once a week	19% (80)
Twice a week More	9% (38)
	4.5% (19)
Do you feel the need to cut down on your consumption?	
Yes	30.3% (128)
No	69.4% (293)
Do you smoke?	
Yes	4.3% (18)
No	95.7% (404)
Does caffeine increase your academic performance?	
Yes	31.8 (134)
No	25.6 (108)
I don't know	42.7% (180)

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More than half (52.4%) found no change in their appetite while (21.3%) said caffeine decreases their appetite. Total screen time of more than half (55.2%) of the population is more than 4 hours. Many (63.7%) believed that caffeine keeps them active. About three fourth i.e. (73.5%) participants do not exercise regularly, while (14%) exercise less than 30mins per day. Major (67.5%) number of students didn't participate in any outdoor games while another group said they participated once a week (19.1%). Majority of the participants (95.7%) have never smoked. One third (30.3%) also wanted to cut down on their caffeine consumption. One third of the participants (31.8%) reported caffeine consumption does increase their academic performance and (57.3%) reported that it does not. Half of the participants (52.4%) who consumed caffeine reported that it had no effect on eating habits. (Table. 3).

Majority of the participants consumed tea 61.8%, followed by soft drinks 44.8%, coffee 31.5%, hot chocolate 17.8% and energy drink 8.1% while 7.8% reported of not using any of the beverages at all (Figure 1)

Major reason reported for the usage of the drinks was its flavor and as a habit 45%, while another 40% said they regained energy by consumption. More than 1/3 of the participants used it during exams 39.1% and to reduce fatigue 38.2%. Less common reasons included assumption of increased academic performance 31.8%, social gatherings 28.2%, stress 18.7%, and insufficient sleep 17.8%, replace body fluids 3.6%, after workout 1.7% and before training 0.9% (Figure 2)

Nearly half of the study participants responded to have moderate levels of stress 45.5% were as severe forms of stress was reported by 11.6% of the participants (Figure 3)

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beverages (n=422)

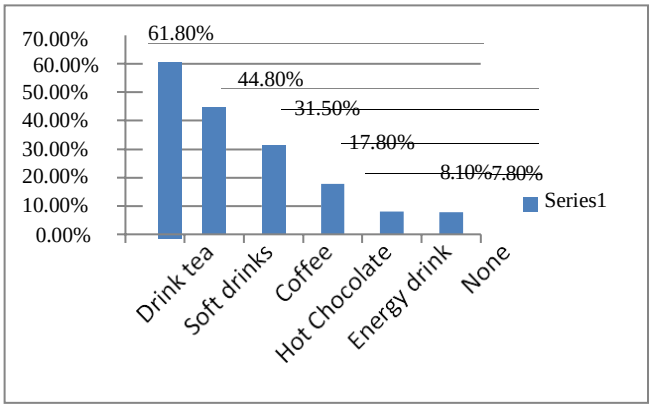

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Figure 2: Reasons for consumption (n=422)

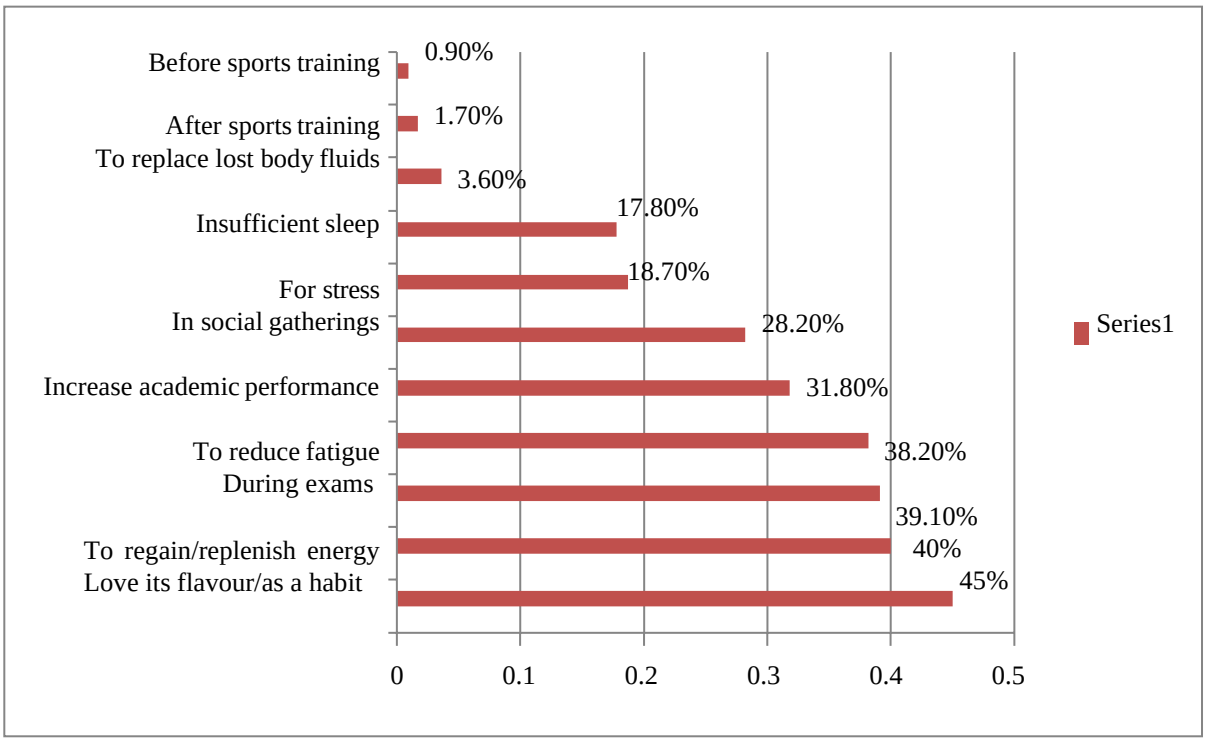
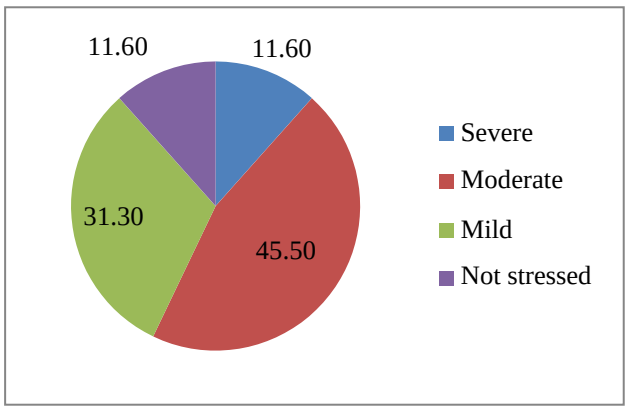


Figure 3: Levels of stress among the study participants (n=422)



DISCUSSION:

Caffeine is one of the most widely consumed beverages in the world. In this study, majority of the students were reported of consuming caffeine in the form of tea (61.6%) and coffee (31.5%).This study demonstrated that majority of the students consuming caffeine was due to the fact that they loved its flavor/as a habit (45%) and to replenish energy (40%). Similar results were obtained from a study conducted in Dow University of Health Sciences, where tea was also the most popular consumed beverage [13]. However, a study conducted at King Saud University reported coffee then soft drinks as the most commonly consumed caffeinated products [21]. This study demonstrated that majority of the students had no idea of whether drinking caffeine had any impact on their academic performances 180/422 (42.7%). Moreover, a study conducted showed that students did consider caffeine had a major role in increasing their academic performances [13]. In contrast to our study, a study from Serbia revealed that the people were mostly consuming caffeine for the reason of leisure, peer pressure and as a habit [22].

A similar study concluded that the majority of the participants were aware of the health risks that followed caffeine usage especially effects on the heart [23]. In this study, we have concluded that mostly the students had about less than 6 hours of sleep every day 198/422 (46.9%). Thus, our results revealed that due to the lesser duration of sleep, students suffered from day time dysfunction mostly once a week 122/422 (28.9%) followed by twice a week 121/422 (28.7%) in others. Similar results were obtained by a survey that concluded that, the lesser the duration of sleep the greater were the chances of daytime dysfunction [24].

A study by Jean-Louis had established a link between substance abuse and daytime sleepiness [24]. Similarly, our study claims that students had difficulty in staying awake during university hours 207/422 (49.1%) and majority of them had actually fallen asleep during class 267/422 (63.3%). In the present survey, students were having no regular outdoor activities 285/422 (67.5%) thus making them highly stressed. Similarly, a survey conducted stated that those students who did workout had been subjected to lesser sleep disturbances and healthier lifestyles [24].

CONCLUSION:

This research concluded that the students who belong to private medical university consume caffeine slightly more than the students who belong to public sector medical university. This research also concluded that caffeine does have some role on sleep habits of medical students as they tend to have less sleep hours, experience day time dysfunction, average quality of sleep, and falling asleep during class. However, our research also shows that caffeine doesn't have much effect on the ability to fall asleep or on waking up during middle of the night. Regarding perception of caffeine effect on eating habits of medical students, this research has concluded that caffeine has no effect on eating habits of medical students, however, it does increase the screening time, keeps them active and smoking has no effect on caffeine intake or vice versa.

CONFLICT OF INTEREST:

The authors declare that they have NO affiliations with or involvement in any organization with any interest in the subject matter discussed in this manuscript.

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DATA AVAILABILITY STATEMENT:

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to ethical restrictions.

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