Use of caffeinated drinks and anxiety in first-year medical students

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Abstract- Since the medical profession is considered to be a very stressful profession and anxiety is prevalent among medical students, it is important to find its various causes. This will help to control anxiety and generally improve students' wellbeing and their academic performance. The present study was planned to determine the level of anxiety and consumption of caffeinated beverages in medical students.

Methodology: A descriptive cross-sectional study was conducted on 104 first-year medical students. A structured questionnaire was used consisting of three sections comprising background information of study participants, habits of drinking caffeinated drinks among students, and anxiety status, which was appraised by 7 items generalized anxiety disorder inventory (GAD-7). SPSS was used for data analysis.

Results: Study participants included 42 (40.4%) males and 62 (59.6%) females, 58.3% day-scholars and 46.2% were hostelites. 88.5% of students said they consume caffeinated drinks. 59.6% of students consume coffee for pleasure and enjoyment. 45.2% consume it for studying at home while 33.7% to stay alert in class. The anxiety level was minimal, mild, moderate, and severe in 28.8%, 39.4%, 19.2%, and 12.5% of the subjects respectively. There was no association between anxiety, gender, residential status, and caffeinated beverage consumption P >0.05. Anxiety is common in medical students, however, it is not associated with caffeinated drink consumption.

Index Terms- Anxiety, caffeine, caffeinated beverages

I. INTRODUCTION

he field of medicine is considered to be one of the most Texhausting and demanding fields, both physically and mentally. Anxiety is quite common in medical students, especially after the COVID 19[1,2]. Medical students are subjected to increased workload, academic stress, competitive environment, financial pressure, and lack of sleep. This leads to poor mental health in medical students[3,4]. The amount of workload may affect a student both mentally and emotionally, depending upon how they respond to stress, and can have a negative impact on students resulting in the development of anxiety and depression among them. According to a meta-analysis, a high prevalence of anxiety is reported globally among medical students[5].

The use of tea and coffee is quite common in our culture[6]. Their consumption is very high among college students. Recently, there has been an increased trend in the intake of energy drinks that have a high content of caffeine[7]. Caffeine and other polyphenolic mixtures of coffee have been related to beneficial outcomes on mental health, for instance, vigour, alertness, improved concentration behavior, state of mind, and cognitive functions. Caffeine utilization had a steady relationship with lower hazard of depression and to ease depressive side effects [7,8]. Along with the beneficial effects caffeine consumption is also associated with sleep disturbances, loss of appetite, palpitations, arrhythmias, negative behavioural disorders, depression, and anxiety disorders[6,7,9,10].

According to the International Coffee Organization, worldwide coffee consumption has increased by 4.2% during the coffee year 2021/22. In Asia and Oceania, this increase was 3.1%[11]. According to the United States Food and Drug Administration about 400 milligrams is a protected measure of caffeine for sound adults to everyday consumption. Most drinks contain around 70 to 100mg of caffeine. At a toxic dose of around 1.2 grams, side effects like palpitations and altered mental state may appear[12]. Pregnant ladies ought to restrict their caffeine consumption to 200 mg daily (around 2 cups), as per the American College of Obstetricians and Gynecologists[13]. Different countries worldwide have specific dietary guidelines for the regulation of caffeine consumption. These target at the community level to aware the population to optimize their caffeinated drinks consumption habits as well as at the production level to monitor the quantity of caffeine to keep it under limits[14].

As caffeine intake is associated with increased mental performance, alertness, and relief of fatigue, medical students' consumption of caffeinated beverages is quite high. Caffeine may cause certain symptoms that overlap with psychiatric symptoms. These include restlessness, irritability, insomnia, inability to focus[9]. So caffeine intake may precipitate anxiety or worsen the symptoms of underlying anxiety in the students.

Caffeinated products include coffee, soft drinks, energy drinks, chocolates, and even some medications[15].

Since the medical profession is considered to be a very stressful profession and anxiety is prevalent among medical students, it is important to find its various causes. This will help to control anxiety and generally improve students' wellbeing and their academic performance. The present study was planned to determine the level of anxiety and consumption of caffeinated beverages in medical students.

II. METHODOLOGY

It was a descriptive cross-sectional study conducted from May to August 2022 on first-year MBBS students of Lahore Medical and Dental College, Lahore (LM&DC), who agreed to participate in the study (n=104), using nonprobability convenience sampling. A structured questionnaire was used consisting of three sections. The first section contains background information on the study participants. The second section comprised information about caffeinated drinks consumption among students. Students were asked about their daily intake of the number of servings of tea, coffee, soda, and energy drinks.

The third section comprised of generalized anxiety disorder inventory (GAD-7), developed by Spitzer et al in 2006[16]. It has 7 items, each rated on a 4-point Likert scale ranging from "not at all" (score 0) to" nearly every day" (score 3), with a minimum score 0 and a maximum score 21. Based on scores anxiety is categorized as minimal anxiety (score 0-4), mild anxiety (score 5-9), moderate anxiety (score 10-14), and severe anxiety (score 15-21). As further clinical evaluation is required if the score is 10 or above, minimal to mild anxiety was categorized together as low anxiety (scores <10), and moderate to severe anxiety was categorized as high anxiety (Scores10-21). It is a valid and reliable tool for assessing anxiety and has good psychometric properties[17].

Data was recorded and analyzed using Statistical Package for Social Sciences (SPSS), version 20. Frequencies and percentages were calculated and presented as tables and figures. Chi-square was used to see the association. $P \leq 0.05$ was considered as statistically significant.

Ethical Consideration

Ethical approval was taken from College IRB (Institutional Review Board), LMDC. Informed verbal consent was taken from the study participants assuring the confidentiality of the data.

III. RESULTS

A total of 104 first-year MBBS students participated in the study. Table 1 shows the background information, caffeine consumption, types of beverages consumed, reasons for caffeine consumption, anxiety levels, and difficulty in daily routine due to symptoms of anxiety. There was no association between between anxiety and gender, residential status, and caffeinated beverage consumption. Caffeine consumption was also not associated with gender and residential status. (Table2)

Table 1: background information, caffeine consumption, anxiety, and difficulty in the daily routine of study participants (n=104)

background information of first-year MBBS students		**Frequency (Percentage%)**
Gender	Male	42(40.4)
	Female	62(59.6)
Residential Status	Day Scholar	56(53.8)
	Hostel lite	48(46.2)
Caffeine Consumption in first-year medical students		**Frequency (Percentage%)**
Consumption of Caffeinated Drinks N=104	Yes	92(88.5)
	No	12(11.5)
Reason for Caffeine consumption N=92		**Frequency (Percentage%)**
To stay Alert in class	Yes	35(38)
	No	57(62)
For Studying at home	Yes	46(50)
	No	46(50)
For pleasure and enjoyment	Yes	62(67.4)
	No	30(32.6)
Anxiety Status and Difficulty in daily routine in first-year medical students		**Frequency (Percentage%)**
Anxiety Level Low N=71	Minimal	30(28.8)
	Mild	41(39.4)
High N=33	Moderate	20(19.2)
	Severe	13(12.5)
Difficulty in daily routine	Not difficult at all	28(26.9)
	Somewhat difficult	62(59.6)
	Very difficult	9(8.7)
	Extremely difficult	5(4.8)
Number of servings per day		**Mean±SD**
Tea		1.04±0.87
Coffee		0.3±0.58
Soda		0.49±0.77
Energy drinks		0.24±0.58
Total number of servings		2.2±1.42

IV DISCUSSION

Caffeine; a widely consumed substance around the world, and its utilization is well-known among students. 88.5% of all members in our study use caffeine in some form with the greatest consumption of tea. 92 out of a total 104 consumed some sort of caffeinated drink. Pleasure and enjoyment was the main motive behind the intake of caffeinated beverages (62%) followed by studying at home (50%) and to stay alert in class (38%). Our results are in accordance with other countries as many studies reported increased alertness and wakefulness to study, good taste and flavour, refreshing feeling, improved concentration, mood elevation, and improved physical performance to be the main

reasons for caffeinated drink consumption [18,19,20]. Mahoney et al. showed that the fundamental motives for caffeine utilization were increased alertness and taste [21].

Table 2: Association of anxiety, gender, residential status, and caffeinated drinks consumption (n=104)

Parameter: Anxiety		**Low anxiety**	**High Anxiety**	**p-value***
Gender	Male	31	11	0.32
	Female	40	22	
Residential status	Day scholar	35	21	0.17
	Hostelite	36	12	
Caffeinated drinks consumption	Yes	64	28	0.43
	No	7	5	
Parameter: Caffeine consumption		**yes**	**No**	**p-value***
Gender	Male	39	3	0.32
	Female	53	9	
Residential status	Day scholar	51	5	0.37
	Hostelite	41	7	

In Pakistan, the Punjab Food Authority has labeled carbonated drinks and energy drinks under the red label meaning they are totally banned in educational institutes, and tea and coffee under the yellow label meaning they can be sold only in moderation.[22]
The mean consumption of caffeinated beverages in our study was 2.2 servings per day with the highest intake of tea and the lowest of energy drinks. (table)This lower consumption may be due to the ban on the sale of carbonated beverages and energy drinks in educational institutes of Punjab. Hence lack of availability might lead to less consumption[22].

Behavior and mental effects connected to psychiatric issues have been related to caffeine utilization. Caffeine can interfere with sleeping patterns when consumed up to six hours before bedtime, decreasing rest by an hour and disrupting sleep effectiveness and REM functions[23]. Caffeine restrains adenosine receptors in the central nervous system, principally in the hippocampus, amygdala, and prefrontal cortex; areas with a high number of these receptors that are related to feeling, discernment, and motivation, which could assume a part in the relationship between improved anergia and caffeine utilization at low doses. High doses may lead to anxiety[24,25]. Medical students see more significant levels of pressure than students in other health-related disciplines. Since caffeine is a psychoactive substance and invigorates the central nervous system, medical students use it to overcome the pressure they face because of studying. Its use is associated with high vigor and alertness and abstinence leads to drowsiness, fatiguability, and anergia[24]. Caffeine consumption among medical students and the association of anxiety with caffeine is reported by many studies. Research on Lebanese medical students revealed a positive correlation between caffeine intake and stress [20]. Caffeine consumption was associated with anxiety among high school students in England [26]. Anxiety was found to be prevalent in 75% of students with 61% suffering from extreme anxiety among students at a university in Medina. However, it was not associated with caffeine consumption[27]. Anxiety status was high in 30.8% of the participants in our study. The anxiety level was minimal, mild, moderate, and severe in 28.8%, 39.4%, 19.2%, and 12.5% of the subjects respectively. We also did not find any association between caffeinated drinks consumption and anxiety (p-value 0.43). The reason behind it might be the low consumption among the study participants due to the lack of availability of fizzy drinks in educational institutes due to the ban by the government[22].

As found in this study, many students use caffeinated drinks to stay alert in class or to study while at home. Caffeine has some undesirable secondary effects, including sleep disturbances, palpitations, arrhythmias, and behavioural disorders[5]. So this habit may ultimately have detrimental effects on their academic performance[3] due to already existent anxiety. Hence, it is imperative that students be taught about this issue.

Anxiety is also associated with decreased academic self-efficacy[26,28]. So identification of other underlying factors that lead to anxiety among students needs to be explored, so that by modifying these factors students' academic performance and well-being may be improved. Our study has a few restrictions, for example, a small population so it lacks generalizability The questionnaire did not include any questions regarding other factors that may be associated with anxiety like family history, personal problems, past history, lack of physical activity, and dietary habits. Also, we did not consider the intake of caffeinated drugs, chocolates, and chocolate-containing desserts and drinks.

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DISCLOSURES

The authors declare that this project was not funded by any organization. The authors also declare no conflict of interest.

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