

## Original Research Article

# “Consumption of Sweets and Caffeine under Stress; A Cross-sectional Study among Dental Students in Riyadh, Saudi Arabia.”

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Lifestyle has an important role in students ending up addicted to caffeine. It can be consumed in different forms apart from coffee including energy drinks. Males tend to drink more energy drinks during their adolescence. This is a cross-sectional study, which targeted 495 male and female dental students from levels 8 up to interns. A closed-ended questionnaire was constructed with the help of related article using survey monkey. From all the participants who have been questioned in the survey, 55% of them were female and the rest of the 45% of them were males. Mean stress levels of female students were found to be higher than males. No significant difference in stress levels among students of different levels was found.

**Keywords:** Stress, Habitual changes, Diet, Dental students.

## INTRODUCTION

Several international studies showed that medical students have high levels of stress, which is defined as a state of psychological and physiological imbalance resulting from the disparity between situational demand and the individual's ability and motivation to meet those needs, most researchers investigating the relationship between food intake and the enhancement of mood and alleviate stress which was mentioned in a research that was done in one of the medical universities particularly in “Miami university”, the survey was administered to 500 students ranging in age between 18 to 22 years, and the students were asked to identify the methods they employed to alleviate the stress, that study showed that carbohydrates were most often consumed food in both men and women (Spillman, 1990).

Caffeine is the most popular beverage used by the young adult in different forms (tea, coffee, pills and energy drinks). Students have been reported to consume a high quantity of caffeine and calories during exam days. A cross-sectional study was carried out in Pakistan to conclude the different reasons for the large consumption for example sleeplessness and headache. Most of the students were aware of its risks such as heart diseases and obesity more than its benefits (Iqbal et al, 2016). Caffeine intake in large quantities can lead to serious health issues. Students usually are one of the common populations having caffeine toxicity (Jin et al, 2016).

Lifestyle has an important role in students ending up addicted to caffeine. It can be consumed in different forms apart from coffee including energy drinks. Males tend to drink more energy drinks during their adolescence (Lieberman et al, 2015). The effect of caffeine on the behavior of its consumers cannot be overlooked. There has been a positive correlation between caffeine and prevention of mood and memory irregularities (Kaster et al, 2015).

Medical students have shown a high prevalence of poor sleep quality, excessive daytime sleepiness and perceived stress were associated with coffee and energy drink intake. An important finding of this study is the relationship between sleep quality and grade point average. The link between sleep quality and academic performance is as yet insufficiently addressed in medical students. The present findings suggest that behavioral intervention aimed at managing stress and decreasing coffee and ED intake might reduce the occurrence of disturbed sleep in podiatric medical students (Sawah et al, 2015). Caffeine intake in any form has been linked with positive behavior unless taken in large amounts. This issue is not only restricted to professional students, but it has affected the secondary and high school students as well (Richards & Smith, 2015).

There was a study done in Korean high school on a group of students going under stress of exams and college entrance preparations, many studies have been done to show the level of stress associated with types of food intake (high calories

food, fast food, high fat and sweet food) Stress affects the body psychology and physiology by affecting the gastrointestinal system and decreasing blood flow, also there are some hormones that are affected by stress which will induce appetite. Other studies reported a relation between cortisol and calorie consumption, which stimulates the appetite and energy full of fat and starchy food, accumulation of cortisol will lead to chronic diseases e.g. cardiovascular, obesity, metabolic syndromes and cancer (Kim et al, 2013).

A study was conducted in Taiwanese university students, which assessed personal lifestyle habits including tea drinking, coffee drinking, alcohol drinking, cigarette smoking, regular exercise and sugar-sweetened beverage consumption. The aim of this study was to find out the prevalence of tea drinking habit among Taiwan students. The results showed a relation between students and coffee drinking, alcohol drinking, sugar-sweetened beverage consumption, minor mental morbidity, poor sleepers, higher BMI, hyperglycemia, and abdominal obesity (Tseng et al, 2014).

Energy drinks are mainly advertised as a rapid solution to a person's mental and physical stress, revamping an individual's concentration and boosting up his/her energy. These drinks contain a high level of caffeine and thus it has a stimulant effect on a person's heart. Containing such amount of caffeine can be dangerous and is probably enough to jeopardize intoxication. As a result, a high level of concern has been raised towards such companies making these drinks, especially regarding the breaking of law which has specified the amount of caffeine in these drinks. But still, there is a doubt that the companies producing such drinks are avoiding this law (JanaStrahler, 2017).

In Korea, especially in the southern region, the energy drinks were not that popular and offered in the markets until 2010. Since then in a duration of 2 years, the consumption of energy drinks rose by 665% to around the total of 19.9 million liters which was a record growth. The increase in usage of energy drinks around these states was especially among the young population which was going through mental illness and stress caused by studies and academic overburden on the students. Students who needed to concentrate more over their studies felt positive after consuming these energy drinks and thus, over consumed them (Iacocca, 2014).

Students found a solution to their exhaustion in routines and low energy levels. South Korean students have an abnormal routine as compared to the students of other Organization for Economic Cooperation & Development (OECD) countries, as they study more and work hard, and get lesser time to sleep in their daily routine. According to a detailed research work conducted in South Korea during the year 2009, the results showed that students study at an average of 7hrs 50min per day, as compared to Japan where the students study for 5hrs 21min, 3hr 49min in England, 5hr 4min in the USA and 6hrs 6min in Finland. On the other hand the South Korean students as compared to the young generation of above-mentioned countries; sleep more than one hour less (Soto, 2015).

The most important ingredients used in the making of energy drinks are sugar and caffeine. Basically, caffeine is used to raise and trigger the level of noradrenaline and serotonin neurons, thus caffeine is commonly known as the stimulator of the main nervous system. Energy drinks containing a high level of caffeine may also shake up the psychological condition of an individual, including the sleeping routine, anxiety, and memory. This is caused by the activation of methylxanthine by energy drinks but, it also depends on an individual's sensitivity towards methylxanthine. Furthermore,

brain activity level is affected and low level of serotonin is linked to the excess amount of sugar used to make these energy drinks (Wardle, 2016).

The consumption of caffeine has been observed to have used mostly in the schooling environment by the teenagers as they face the problems of sleeping disorder, academic pressure, behavioral problems and conductive and violent disorder. Students feel helpful to make up with their studies and daily routine works by boosting up their mental and physical level with the help of these energy drinks. The regularity with which a person consumes food and drinks are highly interconnected with the amount of food and drink consumed. For example, energy and fizzy drinks would be highly consumed if a person is eating fast food whereas he won't take any milk, vegetable or fruits with the same fast food. It would be best to understand the effects of these energy drinks if we combine it with other types of the food a person consumes (Keshari, 2016).

As according to the same study observed in Korea there has been a vast increase in the consumption of junk food which basically is the processed food and it also contains a high amount of fat and sugar, the reason behind this is the high intake of these energy drinks. This has been a concern for the upcoming generation which has been highly dependable on such drinks. Earlier when research was conducted regarding this fast-food potential, it was observed that it has been very dangerous in long-term as it creates a relation with hyperactive behavior and depression which leads to weariness and fatigue. As a result, it is obvious that the consumption of both the fast food and energy drink can have a negative impact on the health and behavior of an individual especially the young generation (Drăgan, 2014).

Caffeine is also found in our daily diets including sodas, coffee, and chocolates. A judicious amount of caffeine consumed can have emerging influence on an individual's fatigue level which would be reduced and also improving consciousness. According to the report, in recent years the usage of caffeine through these easily accessible products such as chocolates and coffee has been increased by as far as 15%. There has been an increase in outdoor coffee houses by 14% and increase in sales of the coffee has been observed around 11%. Not only the adults have been consuming coffees and other caffeine products, but the students and minors have also been taking them to reduce their stress for example before entering the examination hall or getting through the sleeping stress. The awareness among such generation has been lacking recently (S.Regier, 2014).

In around 20 minutes after consuming the caffeine it reaches the blood circulation of the body and is emitted after around 5 hours. In our previous studies, it is proved that a normal amount of caffeine can be pain relieving for an individual and whereas coffee containing a decent amount of caffeine can delay hepatic fibrosis, can prevent from life-threatening problem of liver cirrhosis and it also helps to resist the blood sugar level in diabetes. Furthermore, it also prevents Parkinson's disease and Alzheimer's disease and also certain types of cancers (L.Errisuriz, 2016).

Certain diseases can be caused on the other hand by the overdose of caffeine such as vomiting, depression, insomnia, nausea, and tachycardia. When it comes to the children, caffeine immediately changes the mood and leads to hypertension, reduces sleeping hours and increases headache sometimes too. It eats up the calcium and potassium in the body which slowly and gradually stops the growth rate of the body in the children. Regardless of such effects, various energy drinks comprise of a high level of caffeine as from 30 to

207 mg per bottle or can. Bearing in mind that only 2.5 mg/kg is recommended for children, the risk is higher in those populations. The young generation, being unaware of the vast number of adverse effects of caffeine are getting more and more addicted to the energy drinks and these drinks including coffee too are easily accessible through the markets and restaurants as caffeine is widely used in many types of food in the home or outside (Gillan, 2013).

A report published by Drug Abuse Warning Network states that the cases arriving to emergency departments due to energy drinks overdose have been doubled up in 2011 as compared to cases registered in 2007. Around 21000 cases involving energy drink cases were there in emergency hospitals as compared to 2007 where only 10068 cases were registered. An average age of the patients who were registered in such cases was from 18 to 25 years. A variety of health and mental problems have been suffered by energy drink consumers including over-excitement, insomnia, hyperactivity and headache, and anxiety. Furthermore, if taken with alcohol or very much over consumed, it can be life-threatening (Henriksen, 2016).

A position of mind where a person is mentally or emotionally strained, or the tension resulting when demand is not fulfilled is called "Stress". When a person is going through this state of stress, it can be an emotional one, which can be a result of no money or loss of the loved ones or physiologically which can be caused when a person is totally deprived of food or is going through drug withdrawal process. Besides this rampage use of drug or any other addictive substance can create a deep stress for a person (Smith, 2014).

An organism's or a human's natural homeostasis can be verily challenged by stress in normal conditions. To this situation's response, an individual may react physiologically to regain the level he or she had and lost it by the effect of that stress. Nurturing or in basic terms feeding behavior is the one homeostasis that is interrupted or disordered by stress. These physical features of eating behavior are very comprehensively observed and normally animal models are used as the medium of such studies. But we cannot be sure about such studies as the results have varied a bit each time (Teleman, 2015).

One of the reasons behind these flexible results of the experiments being conducted is that of food chosen for such processes. This is a crucial issue of selecting a specific diet for these experiments as further solutions or curing steps have to be taken based on such results. Priority towards the food has been transferred towards more gratifying meals without any concern towards caloric changes having any connection with stress. Normally during stress, an individual prefers eating food containing high amount of fat and sugar content.

Such as when rats were being chosen for such observation, they were provided with a food which was more edible and pleasant such as sugar or lard, this notably increased the level of stress in the animal in time. In the similar situation, a human prefers highly edible and pleasant food such as snacks, fast-food and calorie dense food (CynthiaRadnitz, 2015).

## AIMS OF THE STUDY

- Determine the extent of caffeine and calorie intake under stress.
- To compare between male and female dental students.
- To compare among different levels of dentistry.

## MATERIALS AND METHODS

This is a cross-sectional study, which targeted 495 male and female dental students from levels 8 up to interns. A closed-ended questionnaire was constructed with the help of related article using survey monkey. Some of the surveys were printed as well and sent to the above-mentioned participants. The survey consisted of points including demographics, perceived stress levels, habits related to consumption of sweets and caffeine etc. We used convenient sampling and selected students from each level randomly.

Once returned back, the data were analyzed using SPSS v. 16. Descriptive statistics including frequencies, Chi-square tests were done to retrieve the results with the value of significance kept under 0.05. Independent 't' test was done to compare the means between genders and levels of dentistry.

## RESULTS

From Fig. 1 below, it can be seen that from all the participants who have been questioned in the survey 55% of them were female and the rest of the 45% of them were males. Moreover, from the second diagram, it is evident that most of the doctors which were a part had an experience of 9 years to 12 years.

A total of 495 dental students took part in this study, with 45% males and 55% females. Ratios of dental students from various levels can be acknowledged in table 2. The stress levels of female students were higher than the males; however, this difference was not statistically significant. Similar comparisons were made among the students from level 8 up to internship. The interns revealed higher stress levels than the others but it was not significant.

## DISCUSSION

There has been a strong association between stressful students and consumption of sweets and caffeine in different forms. Studies have proven that students tend to be addicted towards these things during their undergraduate studies. A study done by Rios et al, (2013) among the medical students in Puerto Rico revealed moderate stress levels and significant consumption of caffeine energy drinks in males more than female. These findings were similar to our study. However, this comparison was statistically insignificant.

Another study conducted by Iqbal et al (2016) in Karachi, Pakistan indicated a very high percentage of students consuming caffeine during exams. The prevalence of caffeine consumption was 100% but there was no statistically significant difference between the levels of medical education. Consumption of caffeine was also noted to be very high during the exams. These findings are contrary to our study results as only 55% of the participants reported to have increased their caffeine consumption during exams.

We were able to compare the responses that we discussed in the aims of this study. However, we could not notice a significant difference among genders or dentistry levels in the majority of questions asked. We plan to expand our scope of study to other health sciences students as well including medicine, pharmacy etc. Moreover, expanding the sample size could also improve the accuracy of our results in future.

The studies conducted by us have proved that the consumption of energy drink has been directly relatable to an individual's stress, courage for suicide, frustration, and isolation. Further, it has a direct relation with the usage or eating of junk food especially (Hojhbrimanesh, 2017).

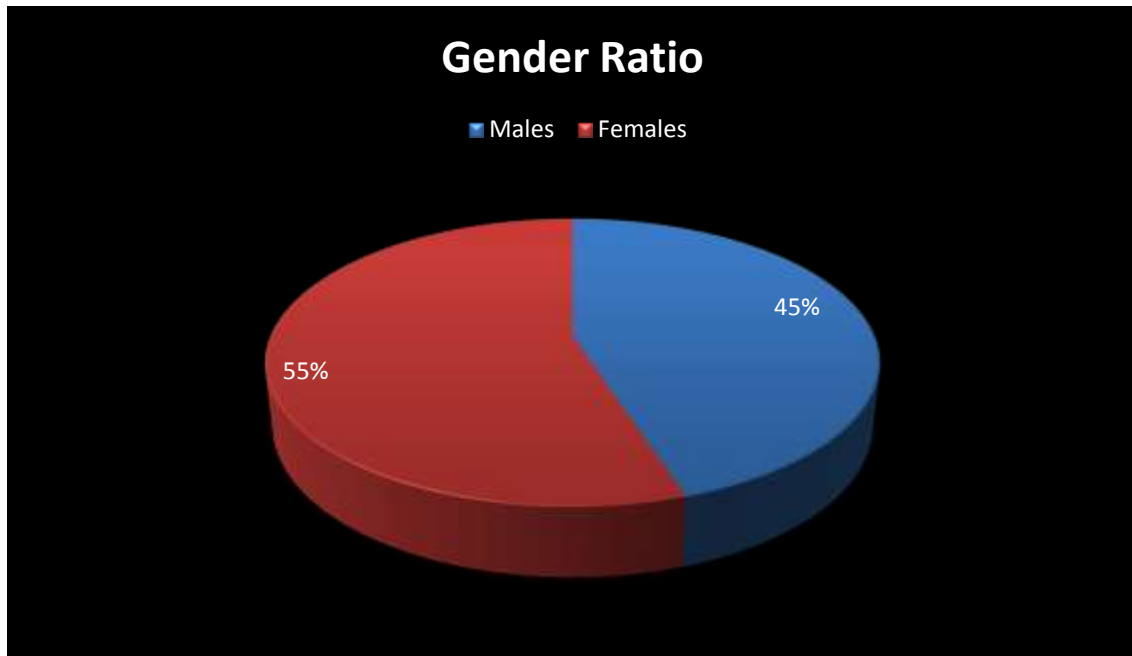


Figure 1: Male to female ratio participants in this study

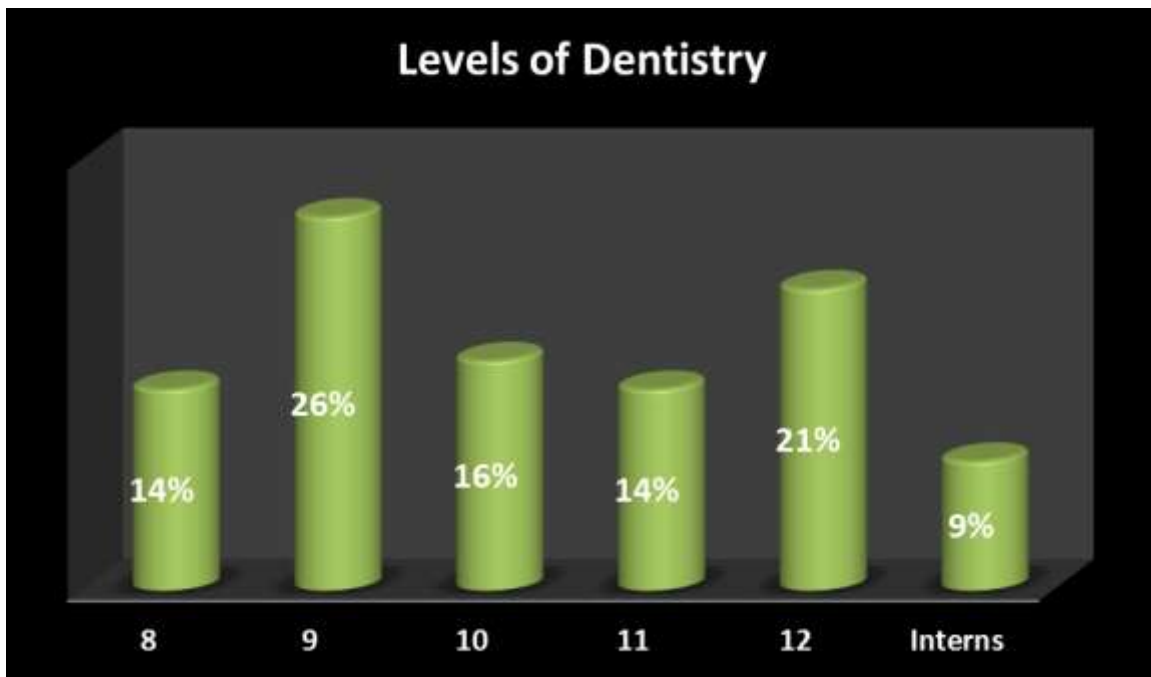
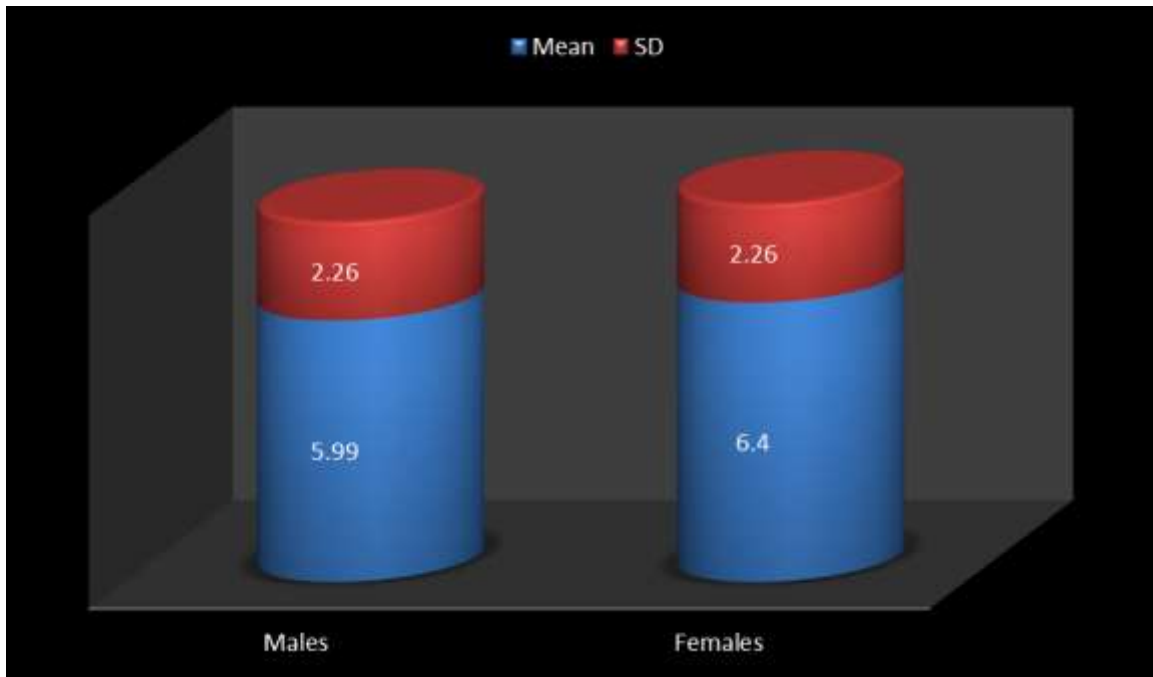
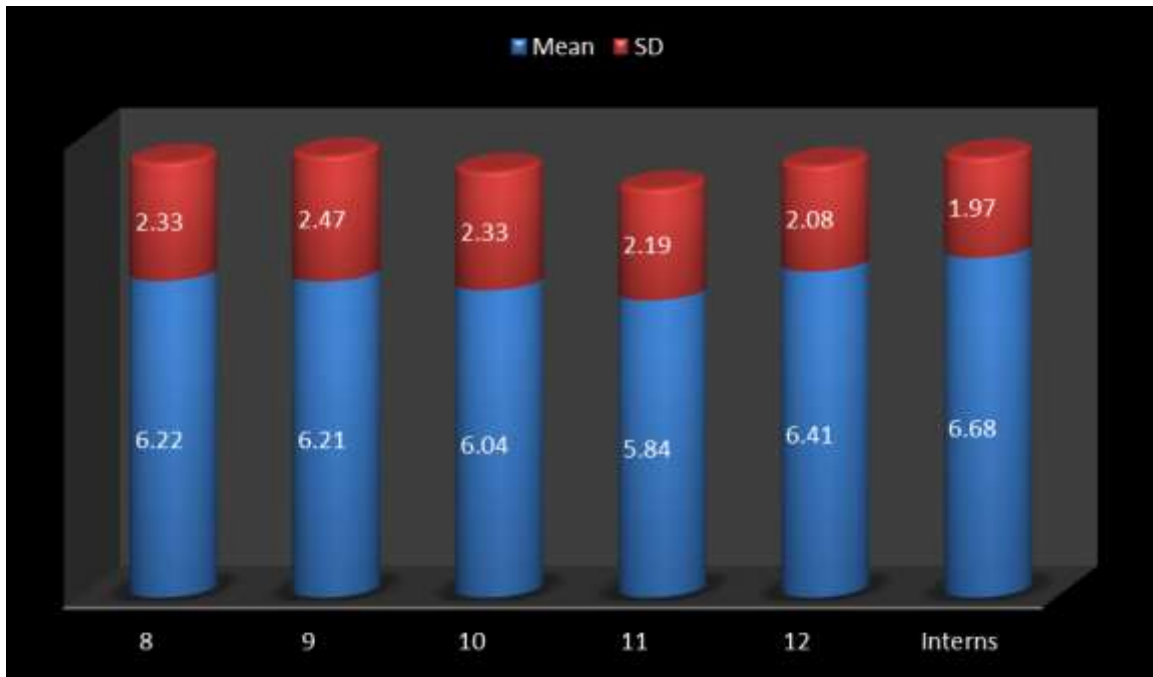


Figure 2: Levels of dentistry participating in this study



p-Value 0.77

Figure 3: Male and female comparisons of mean stress levels with a standard deviation



p-Value: 0.344

Figure 4: Levels of dentistry with their mean scores of stress levels

**Table 1:** Gender comparisons of the questions in the survey

Item					p-value
What do you do under stress?	<b>Consume Sweets</b>	<b>Sleep</b>	<b>Socialize</b>	<b>Nothing</b>	.001
	Males 22% Females 30%	Males 32% Females 41%	Males 6% Females 4%	Males 41% Females 25%	
Consume more sweets/caffeine during exams?	<b>YES</b>		<b>NO</b>		.122
	Males 52% Females 60%		Males 48% Females 40%		
How many cups of caffeine you consume per day?	<b>0-1 cup</b>	<b>2-3 cups</b>	<b>4 or more cups</b>		.049
	Males 62% Females 54%	Males 32% Females 30%	Males 6% Females 11%		
Reason for caffeine consumption?	<b>Headache</b>	<b>Stress</b>	<b>Out of habit</b>		.102
	Males 29% Females 25%	Males 10% Females 17%	Males 61% Females 58%		
Improvement in academic performance?	<b>Agree</b>	<b>Neutral</b>	<b>Disagree</b>		.837
	Males 31% Females 38%	Males 39% Females 42%	Males 17% Females 15%		
Habit increased after starting dentistry?	<b>YES</b>		<b>NO</b>		.112
	Males 67% Females 73%		Males 33% Females 27%		
What side effect of caffeine do you experience?	<b>Anxiety</b>	<b>Sleep disturbance</b>	<b>Palpitations</b>	<b>None</b>	.811
	Males 12% Females 11%	Males 20% Females 23%	Males 13% Females 13%	Males 55% Females 54%	

**Table 2:** Levels of dentistry responses with comparisons

Item					p-value
What do you do under stress?	<b>Consume Sweets</b>	<b>Sleep</b>	<b>Socialize</b>	<b>Nothing</b>	.504
	8 28%		8 3%	8 33%	
	9 24%	8 36%	9 5%	9 34%	
	10 23%	10 34%	10 4%	10 28%	
	11 29%	11 41%	11 2%	11 29%	
	12 29%	12 42%	12 5%	12 23%	
	Interns 23%	Interns 32%	Interns 9%	Interns 33%	
Consume more sweets/caffeine during exams?	<b>YES</b>		<b>NO</b>		.974
	8 57%		8 43%		
	9 56%		9 44%		
	10 57%		10 43%		
	11 54%		11 46%		
	12 58%		12 42%		
	Interns 54%		Interns 46%		
How many cups of caffeine you consume per day?	<b>0-1 cup</b>	<b>2-3 cups</b>	<b>4 or more cups</b>		.615
	8 54%	8 40%	8 6%		
	9 54%	9 33%	9 13%		
	10 60%	10 35%	10 15%		
	11 52%	11 36%	11 12%		
	12 64%	12 27%	12 9%		
	Interns 61%	Interns 23%	Interns 26%		
Reason for caffeine consumption?	<b>Headache</b>	<b>Stress</b>	<b>Out of habit</b>		.041
	8 32%	8 14%	8 54%		
	9 30%	9 11%	9 59%		
	10 20%	10 16%	10 64%		
	11 34%	11 9%	11 57%		

	12 24% Interns 16%	12 14% Interns 20%	12 62% Interns 64%		
<b>Improvement in academic performance?</b>	<b>Agree</b>	<b>Neutral</b>	<b>Disagree</b>		.337
	8 30%	8 52%	8 18%		
	9 55%	9 32%	9 13%		
	10 41%	10 41%	10 18%		
	11 49%	11 33%	11 18%		
	12 37% Interns 36%	12 47% Interns 45%	12 16% Interns 19%		
<b>Habit increased after starting dentistry?</b>	<b>YES</b>		<b>NO</b>		.295
	8 68%		8 32%		
	9 71%		9 29%		
	10 75%		10 25%		
	11 70%		11 30%		
	12 77% Interns 54%		12 23% Interns 46%		
<b>What side effect of caffeine do you experience?</b>	<b>Anxiety</b>	<b>Sleep disturbance</b>	<b>Palpitations</b>	<b>None</b>	.007
	8 12%	8 21%	8 9%	8 58%	
	9 20%	9 18%	9 10%	9 52%	
	10 9%	10 15%	10 22%	10 54%	
	11 7%	11 23%	11 13%	11 57%	
	12 8%	12 25%	12 15%	12 52%	
	Interns 4%	Interns 32%	Interns 5%	Interns 59%	

A range of various mental or health problems have been the main reason for repetitive usage of energy drinks, such as sleeping disorder, mood swings, stress, socio-demographic factors and regular use of alcohol. The greatest risk of life being observed after the consumption of energy drinks among the young generation is when it is used for 5 days a week. This study has been consistent as the research was totally fact-based (Alsubaie, 2017).

The main adverse effects due to caffeine are the reduction in sleeping duration, sleeping disorders and its quality. Subsequently to these effects, an individual stays awake for a long time and feels exhausted and continues to take these energy drinks which further lead to the problems mentioned earlier. And the cycle goes on until the case is in the worst condition. Irritable mood and tension and nervousness can be triggered in a person after overdose of energy drink. Furthermore, withdrawing the use of caffeine, a regular consumer may start to have a normal speaking disability as he doesn't have the same energy level of mind and body both. A person withdrawing caffeine or overdosing it in both cases, he or she might face mood fluctuations, irritable moods and abnormal behavior (Aljawad, 2016).

On the grounds of problems symptoms of depressions and insomnia, both are evidently associated with the regular use of caffeine according to our study. Compared to the older researches, our results were consistent with them too which makes the results clear enough. Youngsters verbally telling about their feelings when they intake the caffeine as their sleep is influenced at night and in the daytime they feel sleepy irregularly. Moreover, prolonged depressive moods are the results of consistent use of caffeine and also when withdrawing the same symptoms occur to the individuals. This shows and is quite obvious that in countries like Korea caffeine usage should be highly warned and people should be made aware of such cases in situations so that the people especially the young generation should be reluctant to its overuse or consistent use (H.Sofia, 2016).

Along with many problems people face after regular intake of caffeine, anxiety has been one of the problems too. But, this problem wasn't significant when we conducted the study. The main possible reason behind this can be that our study was led after the exam days, so the level of stress and anxiety would've been not a prime problem for the student during those days. Keeping in mind that the half-life of caffeine is 4 to 6 hours, it isn't useful to quantify the level of anxiety after so many days or weeks. And so emotions and intellectual and mental functioning would be expected to be minor or unimportant too (Lang, 2017).

Living a healthy life's basic is mainly feeding. There should be a specific balance between spending our energy and saving it. But it is not astonishing that our generation starts facing these stress and anxiety problems at an early stage of their life. Earlier in stone age while humans were evolving, food was limited while there were variable threats to living in every stage of life, which started increasing the insulin levels. Whereas in today's world, people have been provided with easy access to the food and a healthy life which is maintainable but humans are still eating regardless he metabolic need (Lee, 2017).

## CONCLUSIONS

- No significant difference in stress levels among students of different levels was found.
- Females showed higher stress levels than males, but this comparison was not statistically significant.

## CONFLICTS OF INTEREST

There is no conflict of interest among the authors or any other institution or person.

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