A Cross Sectional Study of the Relationship of Caffeine Consumption, Stress and Theirs Effects on the Academic Performance among Female Students in Taibah University

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ABSTRACT

Objective: To determine the relationship between perceived stress and caffeine consumption. To compare the relationship between caffeine consumption and cumulative GPA among female students at Taibah University from different colleges.

Methods and Subjects: A cross-sectional study conducted in Taibah University at Al Madinah Al Monawarah. 300 female students (100 female students from Collage of Medicine, 100 female students from College of Science and 100 female students from College of Computer Science & Engineering. Students who are; non-Saudi, males, aged 18 or less, aged 27 or more, and belonging to different collages at Taibah University other than the three target collages excluded from this study.

Results: The average cumulative GPA of the three colleges were the same ranged from 3.75-4.49 out of 5 being very good. There was a positive significant relation between the academic level and the cumulative GPA in the Collage of Medicine with (r=.299, n=100, P-value of .002) also was positive significant relation in College of Science with (r=.214, n=100, P-value of .032). But, there was no significant relation between the academic level and cumulative GPA in the College of Computer Science & Engineering students. The average

caffeine consumption was 253.24 mg/day in the College of medicine students, 233.92 mg/day in the college of Science students and 252.33 mg/day in the College of Computer Science & Engineering students. There was no positive correlation between the amount of consumed caffeine and Perceived Stress Scale (PSS) along with the relationship of consumed caffeine and the students GPA.

Key words: Caffeine Consumption, Perceived Stress, College Students.

INTRODUCTION

University life is a very stressful time for most of the students due to classes, homework, quizzes, projects, extracurricular activities, midterms and final exams that may lead to overstress on the students. So to handle and cope with this stress and meet the requirements of their classes, university students may use stimulants, like caffeine. Caffeine is a stimulant that acts on the central nervous system and may help to improve memory and alertness.[1] Students may pursue the benefits of caffeine to stay up late at night studying, complete chores, stay awake in classes. Their beliefs about caffeine prompt their use of caffeine as a study aid while stressed.[2] However, it is unknown if really caffeine is improving students' academic performance or not.

The most updated high scale published epidemiological data on caffeine consumption in The United States (US) showed that 87% of total study population in the US regularly consume caffeine in high amount and they found a correlation between their age and consumption amount that approached is 193 mg in age 35 to 64

years.[3] Also, another survey on the potential intake of caffeine were conducted in Brazil, the average and daily intake of caffeine was around 2.7 to 1.8 mg/Kg. Other previous studies showed that caffeine had side effects and might reach intoxication level; studies show that almost every organ system is affected when caffeine is taken in large quantity.[4] 49% of a representative stratified sample of Puerto Rican students reporting caffeinated products to be useful for coping with stress.[5]

In Makkah, Saudi Arabia a study conducted on 437 medical interns in different hospitals showed The total percentage of caffeine consumers were 86.9% (n=380) of all participants.[6]

Recommendations for daily caffeine intake is not being followed due to the perceived benefits of caffeine which include mood improvement, concentration, social factors, and energy boosting. This study was important due the limited data and little is known about caffeine, stress and theirs effects on the academic performance in Saudi Arabia among university students.

OBJECTIVES

1. To determine the relationship between perceived stress and caffeine consumption.
2. To compare the relationship between caffeine consumption and cumulative GPA among female students at Taibah University from Collage of Medicine, College of Computer Science & Engineering and College of Science.

SUBJECTS AND METHODS

A cross-sectional study will be conducted in Taibah University at Al Madinah Al Monawarah from from July 2017 till September 2017. A convenient sample of 300 female students will be conducted randomly from Taibah University female students aged between 19 and 26 years old (100 female students from Collage of Medicine, 100 female students from College of Science and 100 female students from College of Computer Science & Engineering. Students who are; males, aged 18 or less, aged 27 or more, and belonging to different collages at Taibah University other than the three target collages will be excluded from this study. Participation in the study is voluntary, and will not involve financial or any other compensation.

A Research tool is a questionnaire prepared in accordance to relevant literatures and contains (PERCEIVED STRESS SCALE by Sheldon Cohen), Validity of the questionnaire will be tested through the opinions of three experts for language clarity, content, relevancy, ability to understand questions, and the time needed to answer. The questionnaire is in Arabic language. The reliability test will be conducted for the internal consistency of the items by using the reliability coefficients (Cronbach's alpha= 0.8) which is suitable for the questionnaire. and the informed consent of the participants will be obtained.

The questionnaire included 32 questions in 3 sections, the first section included questions about socio-demographic including the academic level and GPA data. The second section questions directed to measure perceived stress scale by Cohen. The third section included questions related to the caffeine consumption amount and types.

Group of female students, belonging to Collage of Medicine, College of Computer Science & Engineering and College of Science at Taibah University will use self-administered structured questionnaire to get the responses from participants. Semi-structured questionnaires pre-tested on 150 of the subjects to explore if there are any items leading to misunderstanding in the questionnaire in order to reach its final form. These 150 subjects will not be included in the main study.

Ethical Considerations

Official permissions will be obtained from the scientific ethical committee of the college. Informed consent will be obtained from all the participants after describing the aim of the study. Privacy and confidentiality will be assured.

Statistical Analysis

Statistical Analysis will be used. Data will be coded, entered, and analyzed using the Statistical Package for Social Science (SPSS) version 20.0 (SPSS, Chicago, IL, USA). Descriptive analysis followed by inferential statistics will be done. Percentages, means, and standard deviations will be calculated for qualitative and quantitative data respectively. Chi-square test (X^2) and Fisher's exact test will be used to statistically analyze qualitative data. Student t- test and ANOVA will be used to compare means for quantitative data when needed. A P-value of 0.05 will be considered as a cut off point for the level of significance.

Table 1: The percentage of the academic level among the students

Academic level	Frequency	Percent
First	29	9.7
Second	30	10.0
Third	48	16.0
Fourth	35	11.7
Fifth	63	21.0
Sixth	50	16.7
Seventh	18	6.0
Eight	27	9.0
Total	300	100.0

RESULTS

The study was conducted on 300 female at Taibah University students aged between 19 and 26 years old, 100 female students from Collage of Medicine with (mean age 22.03, SD= 1.925) and 34% of them were in the fifth academic level, and 100 female students from College of Science with (mean age 21.88, SD=2.056) and 19% of them were in last academic level and 100 female students from College of Computer Science & Engineering with (mean age 21.61, SD=1.953) and 20% of them were in third academic level. The majority of the students were in the fifth, sixth, third academic level 21%, 16.7% and 16% respectively (Table 1). Out of 300 students 285 (89%) are single students, 12(10%) are married and only 3 (1%) are divorced.

College cumulative GPA of each student from each college were asked, the average cumulative GPA of the three colleges were the same ranged from 3.75-4.49 out of 5 being very good. In the Collage of Medicine 47% of the students GPA were ranged from 4.50-5.00 out 5 being excellent while 34% were ranged from 3.75-4.49 out of 5 being very good, in College of Science 69% of the students GPA were ranged from 3.75-4.49 out of 5 being very good, in College of Computer Science & Engineering 47% of the students GPA were ranged from 4.50-5.00 out 5 being excellent. There was a positive significant relation between the academic level and the cumulative GPA in the Collage of Medicine with (r=.299, n=100, P-value of .002) also was positive significant

relation in College of Science with (r=.214, n=100, P-value of .032). But, there was no significant relation between the academic level and cumulative GPA in the College of Computer Science & Engineering students.(Table 2) In our study each student was asked about their work including volunteering outside of college 89 (29.7%) students out of 300 were said they yes with an average of 5.3 hours per week. 44 of them were from the Collage of Medicine, the other 24 of them were from the College of Science, the last 21 were from the College of Computer Science & Engineering. The caffeine consumption of the students were divided according U.S. Food and Drug Administration (FDA) into three categories (Figure 1): 1- low caffeine consumption (1-199mg/day) were 23% of the students in the College of Medicine, 40% in the college of Science and 33% in the College of Computer Science & Engineering. 2- Moderate caffeine consumption (200-399 mg/day) were 58% of the students in the College of medicine, 46% in the college of Science and 45% in the College of Computer Science & Engineering. Finally, 3- high caffeine consumption (more than 400 mg/day) were 19% of the students in the College of medicine, 14% in the college of Science and 22% in the College of Computer Science & Engineering. The average caffeine consumption was 253.24 mg/day in the College

of medicine students, 233.92 mg/day in the college of Science students and 252.33 mg/day in the College of Computer Science & Engineering students. The study showed that the most common sources of caffeine consumption among these colleges were coffee with all its types and brands 50.7% n=258 followed by caffeinated tea 31.6% n-161 and soft drinks 12.4% n=63.

The commonly reported reasons for caffeine consumption among the students were because they need it to wake up in the morning with 26.7%, 27.4%, 30.4% followed by he reason to study for exams with 26.7%, 24.8%, 23% and finally to help them to complete homework/projects with 18.8%, 21.4%, 18.5% in the College of Medicine, in the College of Science and the College of Computer Science & Engineering students respectively. (Fig 2)

The Cohen's Perceived Stress Scale was used which the individual scores can range from 0 to 40. The scores ranging from 0-13 would be considered low stress, scores ranging from 14-26 would be considered moderate stress and scores ranging from 27-40 would be considered high perceived stress.[7] The majority of the students were falling within the moderate perceived stress with 73% in the College of Medicine, 77% in the College of Science and 80% in the College of Computer Science & Engineering students. (Table 3)

Table 2: The academic level and GPA of the students of each college

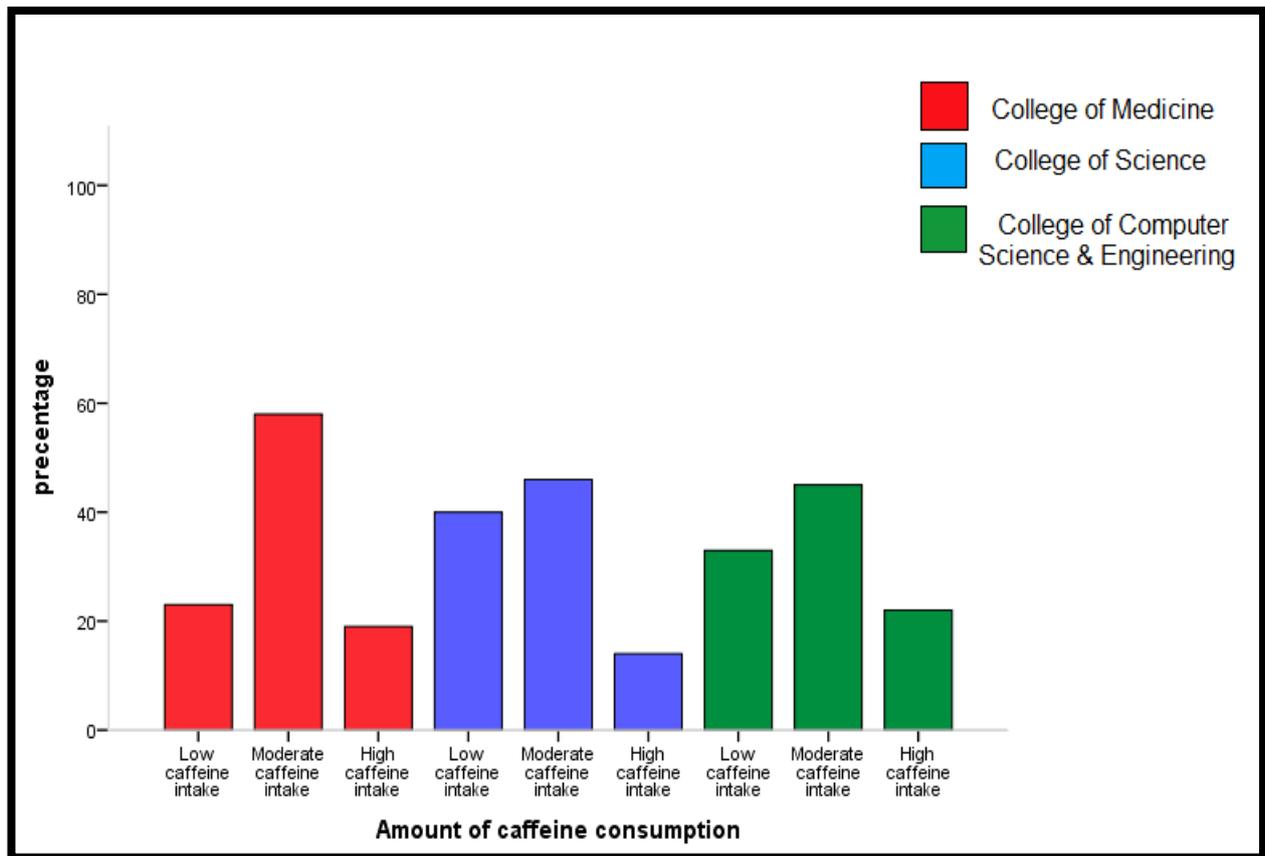| College	Academic level	GPA				Total	P-value
		4.50 - 5 Excellent	3.75 - 4.49 Very good	2.75 - 3.74 Good	2 - 2.74 Pass		
College of Medicine	First	9	0	0	0	9	.002
	Second	3	2	1	1	7	
	Third	10	5	2	0	17	
	Fourth	5	4	0	0	9	
	Fifth	13	14	6	1	34	
	Sixth	7	9	8	0	24	
	Total	47	34	17	2	100	
College of Science	First	1	7	1	0	9	.032
	Second	3	4	0	0	7	
	Third	3	8	0	0	11	
	Fourth	7	8	1	0	16	
	Fifth	4	8	0	0	12	
	Sixth	3	12	1	0	16	
	Seventh	2	8	0	0	10	
	Eight	1	14	3	1	19	
	Total	24	69	6	1	100	
College of Computer Science & Engineering	First	6	3	2	0	11	.780
	Second	8	5	3	0	16	
	Third	10	5	5	0	20	
	Fourth	4	1	4	1	10	
	Fifth	4	6	6	1	17	
	Sixth	5	0	5	0	10	
	Seventh	6	1	1	0	8	
	Eight	4	3	1	0	8	
	Total	47	24	27	2	100	

Figure 1: Percentage of the amount of caffeine consumed among students in each college
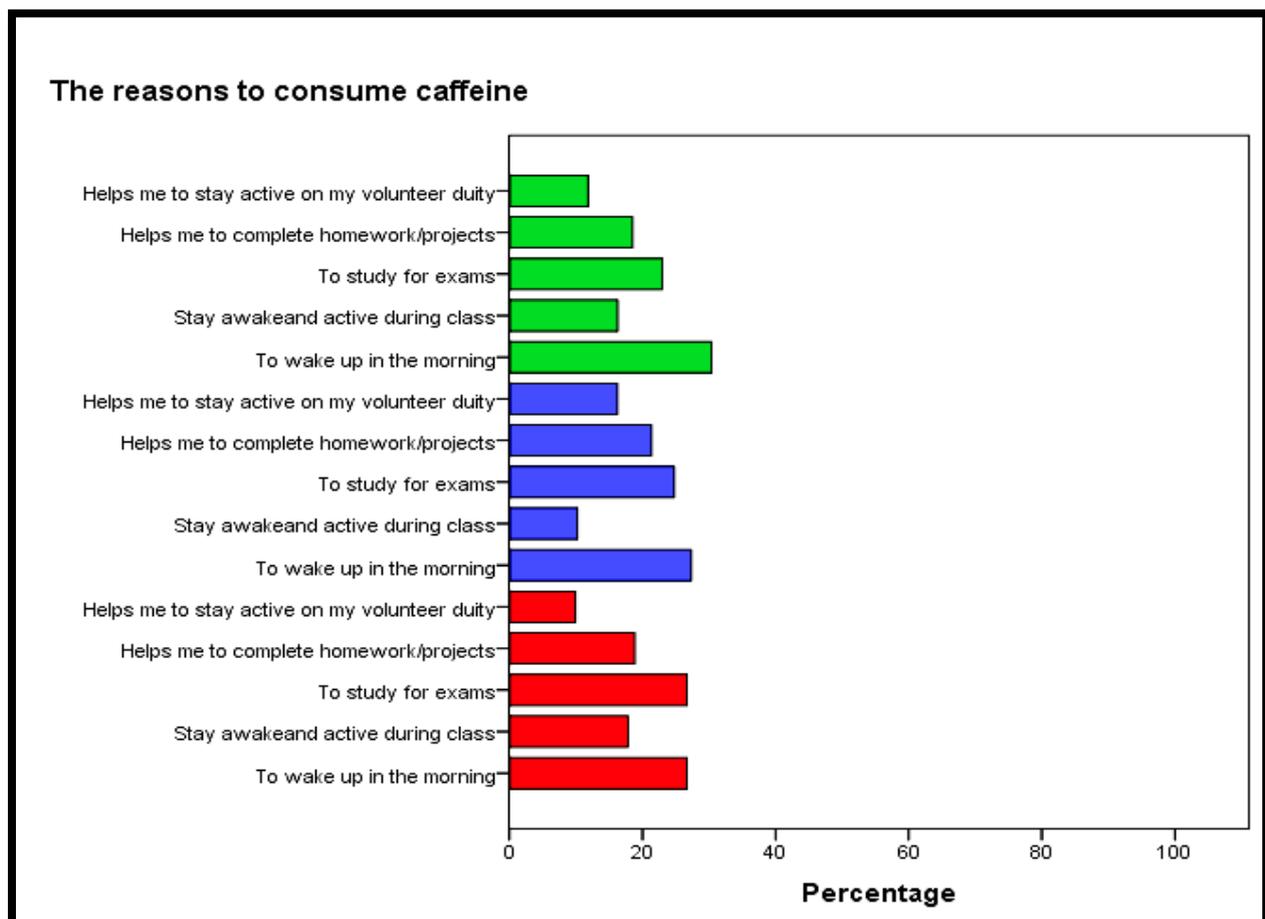

Figure 2: The commonly reported reasons to consume caffeine among students in each college

Table 3: Cohen's Perceived Stress Scale among students in each college

College	Stress Score	Frequency	Percent
College of Medicine	Moderate (14-26)	73	73.0
	High (27-40)	27	27.0
	Total	100	100.0
College of Science	Low (0-13)	2	2.0
	Moderate (14-26)	77	77.0
	High (27-40)	21	21.0
	Total	100	100.0
College of Computer Science & Engineering	Low (0-13)	6	6.0
	Moderate (14-26)	80	80.0
	High (27-40)	14	14.0
	Total	100	100.0

DISCUSSION

The study was conducted on 300 female at Taibah University students aged between 19 and 26 years old, the sample divided into 100 female students from Collage of Medicine with, 100 female students from College of Science and 100 female students from College of Computer Science & Engineering from all academic level.

There found a positive significant relation between the academic level and the cumulative GPA of the students in the Collage of Medicine with (r=.299, n=100, P-value of .002) also was positive significant relation in College of Science with (r=.214, n=100, P-value of .032). But, there was no significant relation between the academic level and cumulative GPA in the College of Computer Science & Engineering students. This is expected and logic as the students want to get better each year and improve their academic performance similar to the study of 1,285 students at China in 2011 found that Female students had a 2.44-higher GPA on average than did male students.[8]

Regarding caffeine consumption, the amount of caffeine content was based on the caffeine chart for beverages from Centre for Science in the Public interest. The average caffeine consumption was 253.24 mg/day in the College of Medicine students, 233.92 mg/day in the college of Science students and 252.33 mg/day in the College of Computer Science & Engineering students. The mean amounts of consumed caffeine between these colleges are almost close being higher in the College of medicine followed by the College of Computer Science & Engineering and lastly the college of Science. These close results could be related to the source of caffeine which was mainly coffee and the easy accessibility in and out the university campus. This findings supported by the study at Zayed University, UAE where the females students consumed 232.2±231.0 mg/day.[9] Also the study of Caffeine consumption among medical students in Japan found estimated daily caffeine use is 250 mg or more in their participants.[10] This supported our findings in the College of Medicine students. In this study the student's caffeine intake was within the recommended U.S. Food and Drug Administration (FDA) daily amount of 400 mg which consider safe and not associated with dangerous or negative effects. Unlike the study where students consumed an average of 849.86 mg of caffeine per day which is more than the recommended daily consumption by FDA.[11]

Our study showed that the most common sources of caffeine consumption was coffee with all its types and brands 50.7% followed by caffeinated tea 31.6% and soft drinks 12.4% and that found also by the study at Zayed University where coffee was the main source of the total caffeine intake in that study population.[9] Another study found that most common caffeinated beverages between their participants are coffee 64%, tea 16%, and soft drinks 18%.[1]

The aims of this study are to determine the relationship between the amount of consumed caffeine and Perceived Stress Scale (PSS) along with the relationship of consumed caffeine and the students GPA in the College of Medicine, the College of Science and the College of Computer Science & Engineering students and compare them.

We used Cohen's Perceived Stress Scale (PSS) the most common used psychological tool for measuring the perception of stress. It is a measure of the extent to which situations someone's life are evaluated as stressful.[7] We found the majority of the students are suffering from a moderate to high stress for example in this study of 100 female students from the College of Medicine we found that majority of the students suffering from moderate to high stress and none of them were suffering from low stress unlike the other two colleges in this study, this could be related to medical students stressful competitive environment to get high grades in their subjects in the college .This correspond to previous study on where they found that perceived stress of medical students' are high in their study sample.[12] Amrita Chakraborti showed that Perceived stress was considerably high in their study population.[13] Also another study showed academic load was significantly correlated with stress level (p<0.001).[5]

As regarding to relationship between the caffeine consumed and the students GPA there were no significant correlation in those three colleges this is could be due to the small simple size (300) students in this study so further investigation need to be done with bigger sample size. Our findings are consistent with the study conducted at the University of Kentucky, U.S. where they found no significant relation as well.[11] Unlike the study that conducted at Makkah, KSA found that students who had good gradin GPA had higher caffeine consumption.[6] Another study conducted in Korea found that higher caffeine intake was associated with lower academic performance similar to another study showed their

participants caffeine consumption mainly from energy drinks and academic performance were negatively correlated.[14,15] The previous studies had mixed and different results so further investigation could be conducted to fully understand and explain the association. This study also found no significant correlation between perceived stress from college that may lead students to consume more caffeine this also supported by the study at the University of Kentucky, U.S.[11] Another study conducted at the University of Puerto Rico Medical Sciences Campus (UPR-MSC) found no association as well.[5] But, there was pervious study found Positive correlations existed between participants' perceived stress and caffeine consumption mainly from energy drink.[15]

Regarding The most common reasons for caffeine consumption among the students were because they need it to wake up in the morning with 26.7%, 27.4%, 30.4% Followed by he reason to study for exams with 26.7%, 24.8%, 23%, and finally to help them to complete homework/projects with 18.8%, 21.4%, 18.5% in the College of Medicine, in the College of Science and the College of Computer Science & Engineering students respectively. These results also found in the study conducted at Zayed University, UAE showed commonly reported reasons behind caffeinated drinks were to stay awake, and to increase concentration.[9] In another study found the reason for caffeine consumption were, 58% during studying, 42% to feel alert, and 60% to reduce stress.[16] There was study conducted at Hamsheir University, U.S. found out 79.7 %, consume caffeine when they did not get enough sleep. 65.7% of the students consumed caffeine for studying for an exam 68.5% consumed caffeine while doing homework.[17]

CONCLUSION

Caffeine consumption is common practice among college students. This study conducted in three colleges at Taibah University from Collage of Medicine, College of Science and College of Computer Science & Engineering. the results were almost close but higher slightly in the college of Medicine .There was no positive correlation between the amount of consumed caffeine and Perceived Stress Scale (PSS) along with the relationship of consumed caffeine and the students GPA. We found a positive significant relation between the academic level and the cumulative GPA of the students in the Collage of Medicine with (r=.299, n=100, P-value of .002) also was positive significant relation in College of Science with (r=.214, n=100,P-value of .032).But, there was no significant relation between the academic level and cumulative GPA in the College of Computer Science & Engineering students. The caffeine consumption among these collages was within the recommended daily dosage of caffeine based on FDA. The perceived stress was mostly moderate (14-26 score) to high (27-40) in the three colleges. Further investigation could be conducted to measure and asses the educational level of awareness about caffeine consumption and their side effects on the health.

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