

Caffeinated – Beverages Consumption Habits and Use among Medical Students in North Jordan

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Abstract

Background: Caffeine is the most common used drug in the world. Caffeine usage among college students is known to increase alertness and concentration, as well as to defeat stress and exhaustion. The purpose of this study was to evaluate caffeinated – beverages consumption habits among medical students, especially during examination periods, and reasons for their daily consumption.

Methods: This was a cross-sectional study conducted during March 2017 on medical students in two medical colleges in Irbid, Jordan, namely, Jordan University of Science and Technology, and Yarmouk University. A total of 520 students participated in the study. A survey was conducted online and completion of the survey was considered as a consent to participate in the study. Descriptive statistics and logistic regression were used to analyze the elicited data.

Results: Ninety-two percent of students consume caffeine, while 78% reported increased caffeine consumption during exams. Coffee and tea were the most common caffeinated beverages used. Reasons for caffeine consumption were to stay awake for more hours during exams (46%), as daily routine (37.5%), to increase concentration (35%), to control stress (19.6%), or as part of norms or traditions (15%). As a predictor, coffee consumption was significantly associated with “consumption during exams”, “a daily routine”, “to increase concentration”, and “to control stress”. Frequency distribution of demographic information and reasons of consumption were significant in response to “increase caffeine consumption during exams”.

Conclusion: The high percentage of caffeine consumption on a daily basis and during exams among medical students mandates serious efforts to distribute awareness on benefits, side-effects and withdrawal symptoms.

Keywords: Caffeine, Students, Jordan, Health, Coffee, Beverages.

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Introduction

Caffeine (1, 3, 7-trimethylxanthine) is a natural alkaloid that stimulates the central nervous system [1]. It is found in coffee, decaffeinated coffee, tea, caffeinated soft drinks, energy drinks, chocolates, non-beverage

food items, and medications [2]. Superseding other drug usage, caffeine is known to be the most widely consumed drug in human history, exceeding 80% of the world’s population nowadays [3]. Although caffeine is usually used as a part of a daily diet, many people use it specifically to relieve pain, to improve

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performance of vigilance tasks, to increase attention span and planning, or to increase loco motor speed [4, 5]. Nonetheless, uses of caffeine is not limited to short-term effects. There is evidence of caffeine positive effects in improving long-term memory and anti-inflammatory properties, as well as in the prevention of chronic diseases, such as type 2 diabetes mellitus, Alzheimer's, Parkinson's disease, and liver diseases; mainly cirrhosis and hepatocellular carcinoma [6-11]. These effects of caffeine make it the most commonly used drug worldwide.

Caffeine is very commonly used among college students [12-14]. Students' daily work, homework, activity, in addition to socialization increased the demand among students for caffeinated products [15]. Several studies were conducted to study caffeine consumption among college students. Some showed that an average student consumes about one cup (70mg) of caffeine per day [16], and another showed that forty percent of adults aged 18 to 24 years old who typically attend college, drink coffee every day [17], with an increase of consumption rate from 2012 to 2016. Further, a relatively recent study that included a large sample from the US population showed that 88% of participants consumed at least one caffeinated beverage [14]. In addition to coffee consumption, energy drinks are also becoming a major source for caffeine consumption. One study showed that around 43% of students participated in their study ($n= 866$) were energy drinks users [18], and another conducted on US college students showed that 51% of participants were defined as energy drinks users [15].

College education, and in particular, medical education, often requires extensive hours of studying. Medical students have large

volume of material to read and work to do. Moreover, during the pressure of examination periods, many students tend to increase their caffeine consumption without considering its adverse effects, but only for the sake of beating sleepiness and exhaustion, and maintaining a good GPA [19].

There are few studies done to examine changes in caffeine consumption among medical students during exams, and to the best of the knowledge of this study's researcher, there has not been any study conducted for that purpose on medical students in Jordan. Therefore, the aim of the present study is to evaluate the prevalence of caffeine consumption among medical students in two medical colleges in Jordan, to examine if consumption increases during exams, and to assess factors responsible for caffeine consumption.

Methods

This is a cross-sectional study conducted in March 2017. Two universities that have a medical college in northern Jordan were included in the study, namely, Jordan University of Science and Technology (JUST) and Yarmouk University. Both are located in Irbid, Jordan. An online convenient sampling technique was used to collect the data through sending a link to the Facebook group account of medical students in both universities. The number of medical students in both universities exceeds 3000 students. However, the number of those who are actively in the Facebook group is not known. The number of students who completed the survey was 520 students from both universities. The inclusion criteria were medical students from year 1 to year 6 in JUST and from year 1 to year 4 in Yarmouk University because the program was recently

established i.e. 4 years ago. The questionnaire was a 9-item questionnaire that included demographic information (age, gender, and University attended), daily consumption of caffeine – containing beverages, consumption during exams, and reasons for caffeinated – beverages consumption.

Descriptive statistics included demographic characteristics and caffeinated beverages consumption habits. Pearson χ^2 was used to evaluate the differences in frequency distribution of responses to “increase caffeine consumption during exams”. Binary logistic regression was used to examine the relationship of demographic characteristics and consumption habits with “consumption during exams” and with “reasons for caffeine consumption”. Analyses were performed using SPSS 20 software, and an alpha level of .05 was considered significant for all statistical tests.

Results

A total of 520 medical students participated in the study. The participants were 195 males

(37.5%) and 325 females (62.5%). Over 95% of students were 18 – 23 years old, and 3 out of 4 students were from JUST College of Medicine. Over 90% of students (92.1%) reported consuming at least one type of caffeinated beverages. Most students were coffee or tea drinkers. Around two thirds of students drink coffee or tea at least once daily. However, many of them (59%) do not drink soda, and most of them do not drink energy drinks (92.3%). Less than half of participants (46%) reported consuming caffeine to wake more hours during exams, and around one third consume caffeine as daily routine or to increase their concentration (37.5% and 35%, respectively). Further, about one fifth (19.6%) of students consume caffeine to control stress or as a part of norms or traditions (15%). It is interesting that around 4 out of 5 students increase their caffeine consumption during exams. Increased caffeine consumption during exams was significantly associated with demographic characteristics (Table 1) and also with consumption habits (Table 2).

Table 1: Demographic information of participants

Characteristics	Do you consume more caffeinated beverages during exams?		*P-value
	No	Yes	
Gender			
Male	40 (20.5%)	155 (79.5%)	<0.0001
Female	75 (23.1%)	250 (76.9%)	
Total	115	405	
Age (years old)			
18-20	56 (20.7%)	215 (79.3%)	<0.0001
21-23	52 (23.1%)	173 (76.9%)	
24-26	6 (26.1%)	17 (73.9%)	
More than 26	1 (100%)	0 (0%)	
Total	115	405	
University attended			
Jordan University of Science and Technology	90 (22.4%)	312 (77.6%)	<0.0001
Yarmouk University	25 (21.2%)	93 (78.8%)	
Total	115	405	

*based on Chi-square test statistics

Table 2: Frequency and habits of caffeinated beverages consumption

Caffeine Consumption	Do you consume more caffeinated beverages during exams?		*P-value
	No	Yes	
Daily coffee consumption			
I don't drink	76 (41.5%)	107 (58.5%)	<0.0001
One time	28 (16.8%)	139 (83.2%)	
Two times	6 (5.5%)	103 (94.5%)	
More than 2 times	5 (8.2%)	56 (91.8%)	
Total	115	405	
Daily Tea consumption			
I don't drink	46 (26.4%)	128 (73.6%)	<0.0001
One time	47 (20.3%)	184 (79.7%)	
Two times	12 (18.8%)	52 (81.2%)	
More than 2 times	10 (19.6%)	41 (80.4%)	
Total	115	405	

Caffeine Consumption	Do you consume more caffeinated beverages during exams?		*P-value
	No	Yes	
Daily soda consumption			
I don't drink	70 (22.7%)	238 (77.3%)	<0.0001
One time	36 (21.4%)	132 (78.6%)	
Two times	6 (18.2%)	27 (81.8%)	
More than 2 times	3 (27.3%)	8 (72.7%)	
Total	115	405	
Daily Energy drinks consumption			
I don't drink	113 (23.5%)	367 (76.5%)	<0.0001
One time	2 (5.7%)	33 (94.3%)	
Two times	0 (0%)	2 (100%)	
More than 2 times	0 (0%)	3 (100%)	
Total	115	405	
Reasons for consuming caffeinated beverages			
Stay Awake			<0.0001
No	93 (33.2%)	187 (66.8%)	
Yes	22 (9.2%)	118 (90.8%)	
Daily Routine			<0.0001
No	70 (21.5%)	255 (78.5%)	
Yes	45 (23.1%)	150 (76.9%)	
Increase concentration			<0.0001
No	97 (28.7%)	241 (71.3%)	
Yes	18 (9.9%)	164 (90.1%)	
Control stress and exhaustion			<0.0001
No	107 (25.6%)	311 (74.7%)	
Yes	8 (7.8%)	94 (92.2%)	
Traditions			<0.0001
No	79 (17.9%)	363 (82.1%)	
Yes	36 (46.2%)	42 (53.8%)	

*based on Chi-square test statistics

Coffee consumption was the only habit which was significantly associated with consumption during examination periods. Those who drink coffee once daily (OR= 3.526, 95% CI = 2.136 – 5.821, $p < 0.0001$), twice

daily (OR= 12.193, 95% CI = 5.088 – 29.222, $p < 0.0001$), or more than twice daily (OR= 7.955, 95% CI = 3.043 – 20.795, $p < 0.0001$), were more likely to increase their caffeine consumption during examination periods

compared to those who do not drink coffee. In addition, those who drink coffee once daily, twice daily or more than twice daily are more

likely to do that because of a daily routine, to increase concentration, or to control stress, as shown in Table 3.

Table 3: Relationship of coffee consumption with different reasons of caffeine consumption

Reasons	Daily Routine		
	OR	P value*	CI (95%)
Daily coffee consumption			
I don't drink	1		
Once	1.942	0.006	(1.214 – 3.107)
Two times	3.16	<0.0001	(1.894 – 5.272)
More than 2 times	7.656	<0.0001	(4.022 – 14.574)
	Increase concentration		
Daily coffee consumption			
I don't drink	1		
Once	2.918	<0.0001	(1.818 – 4.686)
Two times	2.991	<0.0001	(1.773 – 5.048)
More than 2 times	3.134	<0.0001	(1.684 – 5.830)
	Control Stress		
Daily coffee consumption			
I don't drink	1		
Once	2.196	0.008	(1.226 – 3.934)
Two times	2.540	0.004	(1.354 – 4.765)
More than 2 times	2.981	0.003	(1.449 – 6.130)
Binary logistic regression was used in the analysis			
Only significant predictors were illustrated			

It is interesting that males are less likely to consume caffeine to control their stress compared to females (OR= 0.512, 95% CI = 0.306 – 0.857, $p = 0.011$), and that not drinking tea or drinking once daily was significantly associated with stress control (OR= 3.59, 95% CI = 1.18 – 10.97, $p = 0.025$) and (OR= 3.03, 95% CI = 1.01 – 9.13, $p = 0.048$), respectively.

Discussion

Medical college students encounter many

challenges academically and socially. One main challenge is to score high on exams, which usually requires long preparation and high concentration. A common way practiced among college students to defeat exhaustion, to empower the brain, and to invigorate the body is to consume more caffeine [15].

As expected in this study, many students reported increased caffeine consumption during examination period (78%). In addition, most caffeinated beverages used were coffee and tea,

which are the most common beverages among the public in Jordan, the Middle East, and other parts of the world [12-14, 19-22]. Although some students reported not consuming any type of caffeinated beverages (7.9%), the majority of students (92.1%) reported consuming at least one type of caffeinated beverages on a daily basis. This high percentage is consistent with other studies [3, 12-20]. However, for those who reported not consuming any type of caffeinated beverages daily ($n=41$), more than half of them (51.2%) consume caffeinated beverages during exams. On the other hand, 3.46% of medical students who participated in this study reported a daily consumption of all types of caffeinated beverages; each caffeinated beverage is consumed once or more daily.

Whether this percentage is considered small or not, it is an alerting sign that those students who consume that much caffeine from different beverages are susceptible to adverse health effects, such as hypertension, neuro-stimulation, and insufficient sleep [23-25]. Further, energy drinks consumption that is gaining an increased popularity in many countries around the world [18, 26], such as the US [15], were not as popular among the participants of this study. Most students do not drink energy drinks (92.3%), and among those who do, 55% were male students and 45% were female students. It is fortunate that energy drink consumption is not as popular; however, it is possible that it might increase in the future because of advertisements used to attract college students [15].

Regarding the reasons of caffeine consumption, none of the reasons provided in the survey reached 50%, which indicate that students' consumption of caffeinated beverages was not academically or socially related. These findings were not in accordance with findings

of other studies [3, 12, 13, 16, 19-21, 26]. Although some students reported having exams on a frequent basis, and therefore, consume caffeine more often, they considered their daily consumption of caffeine as not academically related.

Coffee consumption is distinguished in this study when compared to the consumption of other beverages. It is the only habit that has a statistically significant association with consumption during examination periods. In addition, it was statistically significant in consumption as a daily routine, to increase concentration, or to control stress. It is also interesting that although coffee is a very common beverage in Jordan, widely used among the public in different occasions, daily coffee consumption did not show a statistically significant association with "traditions and norms" as a reason for consumption, which was contradictory to findings of another study in Jordan [21].

Although this study provided an insight into consumption habits of caffeinated beverages among medical students in northern Jordan, it has some limitations. It did not directly examine the possibility of any addiction patterns among students, nor any side effects they experienced. In addition, the convenient sample used in the study represents only those who participated and cannot be generalized to all medical students in Jordan. Other factors that were not studied include: students' awareness of long-term adverse health effects and withdrawal symptoms. Moreover, the exact amounts of caffeine consumed were not measured (e.g. mg/ml), mainly because this was beyond the scope of this study, in addition to the possibility of providing biased or imprecise answers by students if measurement was through a self-administered survey. However, it is important

to elaborate on that in future studies to estimate real amounts of caffeine consumed, and thereby, estimate possible adverse health effects more precisely, as well as plan awareness programs accordingly.

Conclusion

The prevalence of caffeinated beverage consumption is high in this study, especially coffee and tea consumption. The amount of consumption of caffeinated beverages increases during exams period, which reflects students' belief about the effects of caffeine on mental alertness and stress relief. There is an imperative need to conduct awareness programs among medical and college students

about the health effects of caffeinated beverages consumption, addiction patterns, and recommended consumption amounts.

Recommendations

Coffee and tea are very popular hot beverages among Jordanians, including college students. There is a need for more studies to examine levels of consumption and possible side effects, especially among college smokers.

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Disclosure

The author declares no conflict of interest.

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عادات الاستهلاك والاستخدام لمشروبات الكافيين بين طلاب الطب في شمال الأردن

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الملخص

المقدمة: الكافيين هو أكثر الأدوية استخداماً في العالم. ومن المعروف أن استخدام الكافيين بين طلاب الجامعات يزيد من اليقظة والتركيز، ويستخدم كذلك للتخلص من الإجهاد والانهك. هدفت هذه الدراسة إلى تقييم عادات استهلاك المشروبات التي تحتوي على الكافيين بين طلاب الطب، خاصة خلال فترات الامتحان، وأسباب استهلاكهم اليومي.

الاساليب: تعتبر هذه دراسة مستعرضة وأجريت في مارس ٢٠١٧ على طلاب الطب في كليتين طبيتين في إربد، الأردن: الجامعة الأردنية للعلوم والتكنولوجيا، وجامعة اليرموك الأردنية. شارك ما مجموعه ٥٢٠ طالباً في الدراسة. تم إجراء المسح على الإنترنت، واعتبر الانتهاء من المسح موافقة على المشاركة في الدراسة. تم استخدام الإحصاء الوصفي والانحدار اللوجستي في التحليل.

النتائج: بينت هذه الدراسة أن ٩٢٪ من الطلاب يستهلكون الكافيين، و٧٨٪ أفادوا بزيادة استهلاك الكافيين خلال الامتحانات. كانت القهوة والشاي من أكثر المشروبات التي تحتوي على الكافيين. كانت أسباب استهلاك الكافيين هي استيقاظ ساعات أكثر خلال الاختبارات (٤٦٪)، كإجراء يومي (٣٧,٥٪)، لزيادة التركيز (٣٥٪)، للتحكم في الإجهاد (١٩,٦٪)، أو كجزء من الأعراف أو التقاليد (١٥٪). كان استهلاك القهوة مؤشراً هاماً للاستهلاك خلال الامتحانات، كروتين يومي، لزيادة التركيز، والتحكم في الإجهاد. وكان التوزيع التكراري للمعلومات الديموغرافية وأسباب الاستهلاك مرتبطاً مع "زيادة استهلاك الكافيين أثناء الاختبارات".

الخلاصة: تتطلب زيادة نسبة استهلاك الكافيين بشكل يومي وأثناء الامتحانات بين طلاب الطب جهوداً جادة لبث الوعي حول الفوائد والآثار الجانبية وأعراض الانسحاب.

الكلمات الدالة: الكافيين، الطلاب، الأردن، الصحة، القهوة، المشروبات.