



A Cross-Sectional Study of the Relationship among Energy Drinks Consumption, Smoking and Academic Performance among Male Health Science Students

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Authors' contributions

This work was carried out in collaboration between all authors. Author SAG participated in study design and wrote the draft of manuscript. Authors KA and JAZ participated in study design and carried out the statistical analysis. Authors SAQ, AAG, IAT and SAJ collected and processed the samples. All authors read and approved the final manuscript.

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ABSTRACT

Aims: To estimate the prevalence, attitude and magnitude of consumption of energy drinks among health science students. To establish the relationship between consumption of energy drinks and smoking. To determine the relationship between energy drinks consumption and the students perceptions about their academic performance.

Methodology: A cross-sectional study has been conducted including 521 male health sciences colleges students in Prince Sattam Bin Abdulaziz University throughout the period of September 20 – December 20, 2014. A validated, confidential, self – administered questionnaire including questions designed to estimate the prevalence, attitude and magnitude of consumption of energy drinks was used for data collection.

Results: Among 521 male students who participated in this study, 199 students were consuming energy drinks (38.2%). Students consumed energy drinks for many reasons, mostly they like the taste (59.8%). (50.3%) and (39.2%) perceive energy drinks to increase their alertness and academic performance, respectively. More than half of participants not manifest any side effect after consumption, and digestive tract upset were reported as the most frequent side effects.

Conclusion: Energy drinks consumption is common behavior among male health science students. Heavy consumption of energy drinks can have some adverse effects including digestive tract upsets. Participants perceive energy drinks to increase their alertness and academic performance. However, people who consume these drinks are more likely to be alert compared to those who do not.

Keywords: College students; energy drinks; smoking; academic performance.

1. INTRODUCTION

Recently, energy drinks consumption has become a prevalent in the daily lives of the college students [1]. An energy drink by definition is "Beverages consumed as stimulants and tonics. It usually contains a combination of caffeine with other substances. These include the herbal supplements, vitamins, amino acids, and sugar or sugar derivatives for example Red Bull® [2]. The amount of caffeine (1,3,7-trimethylxanthine) in energy drinks varies from 50 mg to over 500 mg per can [3]. The stated amount is accountable for most of the side effects of these drinks. It is as well considered to be an addictive substance [4]. Caffeine is a central nervous system stimulant that can increase alertness and enhance mood. The major caffeine withdrawal symptoms include Headache, Depression, and Anxiety among others [5].

Energy drinks popularity started in 1997 when Red Bull® was released, five hundred new brands of energy drinks were launched then [6]. The energy drinks companies target young adults consumers by different means. The recent marketing data show that the market for energy drinks has experienced a higher growth rate [7]. In a study conducted in Saudi Arabia that is considered as a home of the largest youth population in the region, statistics revealed that

as of 2013, young adults and the middle-aged, aged 18-44 for 49% of the population [8]. Young people constitute a significant proportion of people who consume energy drinks. Additionally, the youths are more susceptible to habits that are common among other young people [9]. It gives weight to the importance of understanding the consumption patterns of energy drinks among young people.

Various researchers have associated increased alertness, performance and vigilance with caffeine consumption [10]. However, excessive consumption of energy drinks could have some adverse effects on the consumer's body. Most energy drinks found in the market contain caffeine, which if consumed in excess could cause bodily harm to the user [11]. Some of the adverse effects include loss of sleep, and stress on a person's cognitive capabilities [12]. As seen above, caffeine increases alertness and consequently allows people to work for longer hours. However, this increased alertness may not necessarily improve the performance and may even sometimes strain the brain [12]. It may consequently have an adverse impact on the user's cognitive capabilities.

This study's main purpose is to estimate the prevalence, attitude and magnitude of consumption of energy drinks among male health

science students. Further, the study seeks to determine the relationship between energy drinks consumption and smoking and at the same time to determine the relationship between energy drinks consumption and the students perceptions about their academic performance.

2. METHODS

2.1 Participants and Measure

The study investigated all male health science students in Prince Sattam bin Abdulaziz University, Al-Kharj, Saudi Arabia during the academic year 2014 – 2015. Females were excluded from this study because colleges of Medicine and Dentistry had not yet established their acceptance, and female students of Pharmacy and Applied Science were difficult to reach. A cross-sectional study was conducted between September and December 2014. The total number of male health science students in Prince Sattam bin Abdulaziz University was 1086 –according to the academic affairs of each college - during the academic year 2014 – 2015. The participants were enrolled through convenience non-random sampling. The sample size was calculated at 99% confidence interval and 5% worst acceptable limit, the estimated sample size was 413 using Rao soft website. The number was increased by 100 to account for any possible data loss.

Validated, confidential, self – administered questionnaires were distributed for data collection. The questionnaire has been used for previous studies in Umm Al-Qura, Buffalo, and Dammam universities. Permission to use the questionnaire was obtained from the corresponding authors through e-mails. The questionnaire included questions regarding personal information such as, age, academic level, and Grade Point Average (GPA), social and lifestyle information, use of energy drinks or not, beginning and motive to start using energy drinks. Further the questionnaire questioned consumption rates per week, rate and maximum number of energy drinks used in a single day, reasons why they consume energy drinks (belief that it improves performance, increase alertness), side effects of drinking, depression, anxiety and sleep disturbance. Additionally, with the first brand in mind, principal component of energy drinks, some recommendation regarding consumption of energy drinks with drugs, after exercise, and if they recommend using energy drink to their family or not were also some of the

questions asked in the questionnaire. The limitation of language barrier was overcome through the translation of the questionnaire from English to Arabic. The Arabic version was used for the data collection. The questionnaire was pilot tested using ten students who were not part of the study before the data collection. Two consultants in the field of Family Medicine ascertained its validity. Electronic questionnaires were distributed through announcements made in each of the colleges enrolled, but a poor response was found. They were then distributed manually.

2.2 Data Analysis

Data were collected, coded by hand then entered into Statistical Package for Social Science (SPSS version 20.0) software. Descriptive statistics was computed in the form of frequency and percentage for categorical data. Chi-square test was the main inferential statistic used to determine the relationship between variable with $P < 0.05$ considered statistically significant.

2.3 Ethical Consideration

The Research and Ethics Committee of the College of Medicine in Prince Sattam bin Abdulaziz University approved the study. Participants gave verbal consents were taken to fill the questionnaire after explaining the objectives and assurance of confidentiality of information.

3. RESULTS

3.1 Demographics

A total number of 521 participants (ranging from the 1st to 6th academic year) answered the questionnaire. Of all the respondents, students between 19 and 20 years constituted 26.5 percent of the entire population, 21 and 22 year olds constituted 48.8% while 23 and 24-year-olds constituted 24.7% of the entire population. These students were distributed in different proportions among the various academic years. The 2nd years represented thirty-eight percent of the population while the 3rd years held 27.1%. Additionally, the 4th years and the 5th years constituted 16.7% and 11.1% of the population consecutively. The 6th years held the smallest proportion of the entire population with 7.1%. In addition to the academic year and age, the Grade Point Average (GPA), an international unit for calculating the average of all grades, was

applied when classifying the participants. Participants who had a GPA of 2-2.99 constituted 7.4% of the population. Those who had a GPA of 3 - 3.99 represented 46.8% of the population. Additionally those with a GPA of 4 represented 45.8% of the population. The single participants were more than married- the later were only 2.1 percent of the population with the single ones constituting the rest of the population. Many of the respondents stayed with their families compared to those who lived alone. The participants who lived with their families represented 70.1 percent of the entire population. Participants who lived alone were 29.9% of the population.

3.2 Patterns

Various factors were considered when evaluating the patterns of energy drink consumption among the students. Factors such as the age when the consumer began consuming the drink, motivation behind the behavior, the amount of money used in the drinks, consumption rates, and the Maximum energy drinks ever consumed in a single day were considered.

As shown in Table 1 intermediate and secondary levels account for more than half of the participants who used energy drinks for the first time (28.6%, 32.7%) respectively. The primary motive to drink among the students was "with friends" that account for 43.2%. About three-quarters (73.4%) of the students who consume energy drinks were spending "less than 20 Saudi Arabian Riyal (SAR) per week". The consumption rate among the participants was

"1-2 drink per week" in 32.2%. 36.2% of the students who are using energy drink consumed two drinks maximum in a single day.

3.3 Consumption of Energy Drinks and Academic Performance

The consumption of energy drinks is driven by taste besides the enhancement of academic performance. Other factors such as studying, driving, recreational activities, the need for extra energy, sporting activities, and advertisement have been identified as some of the reasons why students use the energy drinks. 59.8 percent of the respondents identified taste as the main reason they consume energy drinks. Further, the need to study for long hours was a major reason for energy drink consumption for 34.4 percent of the respondents. People who use energy drinks when driving for long hours constituted 32.7 percent of the participants, and people who consume the drink for recreational purposes with friends were 26.6% of the entire population of the respondents. In addition, the general need for additional energy was identified as a primary reason by 21.1 percent of the population and 12.6% of the participants argued that they consumed the drinks to increase their sports performance. Furthermore, 11.6% of the population said that they consume the drink to enhance their focus while studying while 9.5 percent of the participants were influenced by media advertisements to consume the drinks. A small proportion of the population (2%) does not take the drinks for the reasons given above.

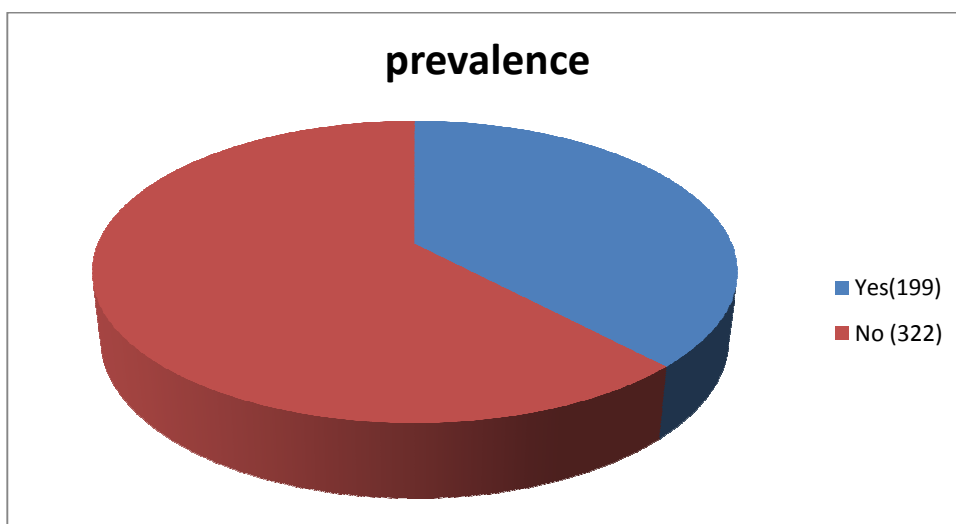


Fig. 1. Prevalence of energy drink consumption

Table 1. Pattern of using energy drinks among participants

Factor	Energy drink consumption patterns	Number of consumers (N=199)	Percentage
First time	Elementary level	33	16.6
	Intermediate level	57	28.6
	Secondary level	65	32.7
	Preparatory level	20	10.1
	Health science level	7	3.5
	Cannot remember	17	8.5
Motivation	With friends	68	34.2
	Curiosity	58	29.1
	Advertisements	30	15.1
	Others	43	21.6
Expenditure per week	less than 20 Saudi Riyal	146	73.4
	20 - 49 Saudi Riyal	39	19.6
	None	14	7.0
Consumption rates	1 - 2 / week	64	32.2
	3 - 4 / week	43	21.6
	Sometimes	42	21.1
	Monthly	22	11.1
	5 - 6 / week	16	8.0
	Daily	12	6.0
Maximum energy drinks ever consumed in a single day	1 drink	67	33.7
	2 drinks	72	36.2
	3 drinks	37	18.6
	4 drinks	10	5.0
	5 or more drinks	13	6.5

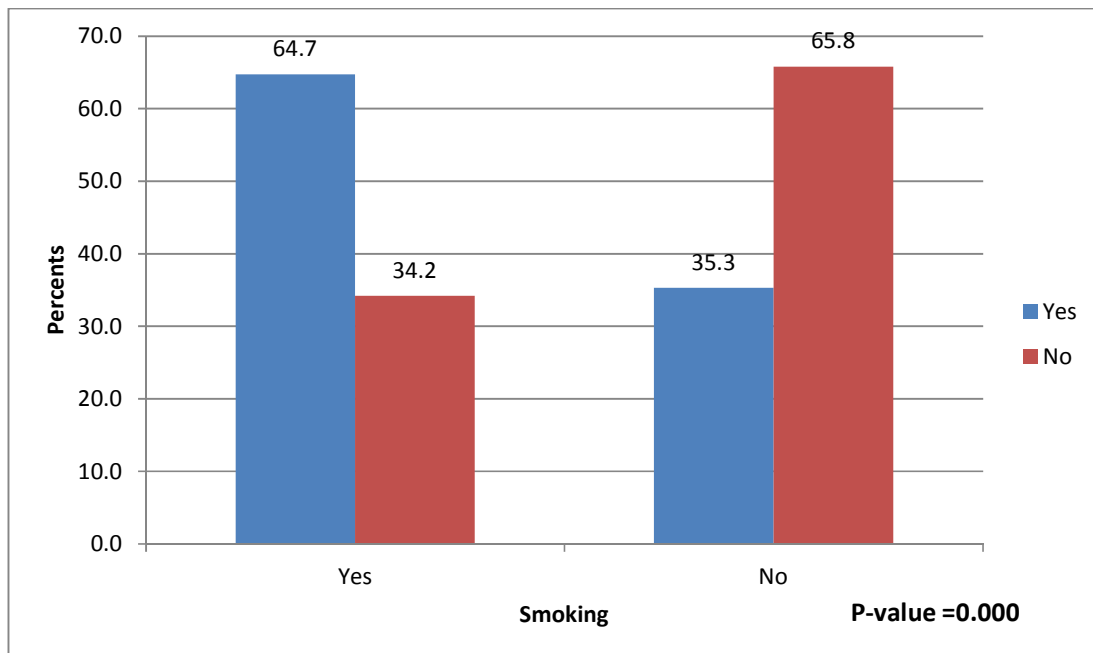


Fig. 2. Using energy drinks according to smoking among students

In Table 2 shows that increased alertness and academic performance are some of the main reasons why energy drinks are consumed by students. Many perceive energy drinks as a source of additional energy, which enables them to perform better in academics and study more due to increased alertness.

As shown in Table 3, p-value was not statistically significant between students who are using energy drinks and those who don't use in regard for first brand in mind, main component of energy drinks or awareness regarding using energy drinks with drugs. P value was significant (P<0.05) in comparison between students who recommend using energy drinks to their families and those who don't, and on comparing between the awareness of recommendation regarding

using energy drinks in thirst after sport or exercise. The above Table shows the proportion of the participants who smoke cigarettes and Shisha.

The above figure shows that 64.7 of people who smoke cigarettes use energy drinks. This group also has a significant P-value (P<0.05) compared with respondents who do not use energy drinks.

Fig. 3 shows the prevalence of energy drink consumption among Shisha smokers is 73.8%, a considerable P-value (P<0.05) compared to those who smoke and do not use energy drinks. The above data shows that there is a direct correlation between energy drink consumption and smoking.

Table 2. Reasons of using energy drinks among students

Feeling		Number	Percentage
Feeling of improvement in performance	Yes	78	39.2
	No	75	37.7
	Do not know	46	23.1
Feeling of increased alertness	Yes	100	50.3
	No	52	26.1
	Not sure	47	23.6

Table 3. Knowledge of study participants toward energy drinks with p-value

	No.	Using energy drinks				Chi square	P-value	
		Yes (199)		No (322)				
		No.	%	No.	%			
First brand in mind	Red bull	211	72	34.1	139	65.9	7.838	0.252
	Bison	142	57	40.1	85	59.9		
	Power horse	48	19	39.6	29	60.4		
	Code red	100	47	47.0	53	53.0		
	Others	20	4	20.0	16	80.0		
Main content of energy drinks	Caffeine	348	132	37.9	216	62.1	2.373	0.796
	Sugar	48	22	45.8	26	54.2		
	Taurine	5	2	40.0	3	60.0		
	Guarana	4	2	50.0	2	50.0		
	Ginseng	1	0	0.0	1	100.0		
Can be used with medication	Don't Know	115	41	35.7	74	64.3	1.461	0.482
	Yes	10	5	50.0	5	50.0		
	No	261	94	36.0	167	64.0		
Recommend energy drinks to family / friends	Don't know	250	100	40.0	150	60.0	42.882	0.001
	Yes	44	37	84.1	7	15.9		
	No	477	162	34.0	315	66.0		
Can be used in droughts or thirst after sports or exercise	Yes	36	24	66.7	12	33.3	18.253	0.001
	No	227	70	30.8	157	69.2		
	Don't know	258	105	40.7	153	59.3		

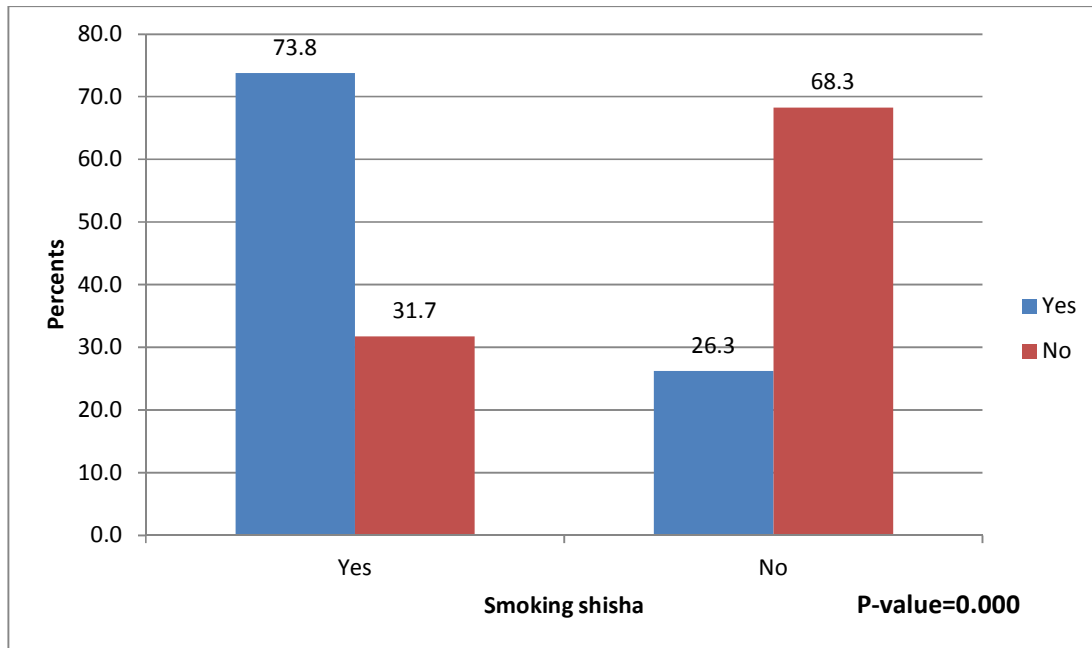


Fig. 3. Using energy drinks according to smoking shisha

4. DISCUSSION

During the past years, energy drinks marketing has increased without sufficient awareness about their side effects. This study's aim was to estimate the prevalence, attitude, and magnitude of energy drinks consumption among health science students in Prince Sattam bin Abdulaziz University. We found that slightly more than one-third (38.2%) of the students were consuming energy drinks. Bwazeer and Alsobahi [6] conducted a similar study in Umm Al-Qura, and found that the prevalence was 27.2% [8]. On the other hand, Alsunni & Badar [9] did a study and discovered that the prevalence of energy drinks consumers in Al-Dammam University was 45.63%. The study from Al-Dammam University revealed similar statistics to ours regarding the maximum number ever consumed in a single day "1-2 cans".

From the study, students were using energy drinks mainly for good grades rather than for late time study. In the study by Bwazeer and Alsobahi [6], the main reasons for using consumption of energy drinks were to replenish energy especially during exams or when undertaking projects. In contrast, in the study by Alsunni and Badar [9] the main reasons for using energy drinks was to give company to friends and to keep awake. Different side effects of using energy drinks were reported from many studies.

According to this study, the major complaints were digestive and urinary tract related adverse effects. It is in contrast to the study by Hidiroglu, Tanriover, Unaldi, Sulun and Karavus [13] which revealed palpitations and sleep disturbances as the most encountered adverse effects. The studies done in by Ibrahim, Fida, Abakhaei and Ahmadi reported heart palpitation and headache as the most common side effects [14]. According to the study from Pakistan, fatigue and weight gain were the most reported side effects [15].

Ibrahim, Fida, Abakhaei, & Ahmadi, [14] conducted a study in Jeddah and found out that energy drinks consumers is smokers in almost two-third of their participants (59.6%). It is similar to our results (64.7%). It therefore, means there is a significant association between using energy drinks and smoking. Regarding the knowledge about the main components of energy drinks, our results was similar to Dammam University results found by Alsunni & Badar [9] that showed 37.14% of the students have chosen the caffeine as the main component and 66.8% of our participants.

In this study the knowledge about recommendations of health science students on consumption of energy drinks to quench thirst after sports or exercise was almost half (49.5%) of the participants don't know and 68.23% by Alsunni & Badar [9]. The main limitations of this

study were the absence of female participation, and reduction of the number of questions to enhance the completion of the questionnaire. Additionally, the study was conducted in only one university in Saudi Arabia and that study results cannot be generalized to include universities in other nations.

5. CONCLUSION

Based on the findings of this study, it would be prudent to conclude that a considerable population of male health science students consumes energy drinks. It consequently implies that the prevalence and magnitude energy drink consumption is high among the male health science students. Additionally, a considerable proportion of respondents who used energy drinks felt that the drinks increase their level of alertness and academic performance. It means that there could be a positive correlation between consumption of energy drinks and performance. However, this may require scientific evidence to prove because the data collected relates to the perceived benefits of consuming energy drinks. Furthermore, a considerable number of people who smoke take energy drinks and this could mean that the smoking increases the chances of using energy drinks or vice versa. Consumption of energy drinks does not have any serious adverse effects. This further implies that the usage of energy drinks can only improve the people's performance. The only side effect reported in the study was the disturbance of the digestive system. Public awareness should be created on the consumption of energy drinks and the potential undesirable effects that may arise from the use. There is the need for further scientific research to confirm some of the findings. For example, further research may be needed to confirm the relationship between the consumption of energy drinks and smoking of cigarettes or Shisha.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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