

ORIGINAL ARTICLE

Energy drink consumption among pre-clinical medical students attending a public medical school in Istanbul, Turkey

Ercan KULAK , Seyhan HIDIROGLU , Emel LULECI , Melda KARAVUS 

ABSTRACT

Objective: It has been reported that energy drink usage is increasing worldwide despite reports of severe adverse health effects. This study aimed to explore pre-clinical medical students' attitudes and perceptions in relation to energy drinks.

Materials and Methods: This was a questionnaire-based descriptive study of pre-clinical medical students attending a public medical school in Istanbul, Turkey. Questions covered the students' sociodemographic characteristics, personal habits (e.g., smoking and alcohol consumption), energy drink perceptions and energy drink consumption, and their experience of side effects from energy drinks. Chi-square tests were used to compare the categorical data.

Results: The mean age of the participants was 21.27 ± 1.37 (range: 19-28) years, and 54.0% (n: 81) were females and 46.0% (n: 69) were males. Overall, 68.0% (n: 102) reported that they had consumed an energy drink at least once in their lives, with 29.4% of these reporting use in combination with alcohol, 22.6% reporting use before exams, 20.6% reporting use before a physical activity, 13.7% reporting use to relieve fatigue, and 48.0% reporting that they had only tried an energy drink out of curiosity.

Conclusion: A large number of participants tried energy drinks out of curiosity, but energy drink consumption was quite common in combination with alcohol. Case studies are needed to provide detailed information on the actual adverse health effects of energy drinks, but in the meantime, energy drink consumption should not be encouraged. Health care providers should educate children and families for the adverse effects of energy drinks.

Keywords: Energy drinks, Alcoholic beverages, Medical students

Introduction

Energy drinks have gained popularity in Europe and North America since the 1980s, with their use increasing worldwide [1], especially among young adults [2]. Energy drinks often contain caffeine in some combination with taurine, 5-hydroxytryptophan, glucuronolactone, inositol, B vitamins, minerals, and herbal ingredients [3]. In Turkey, the caffeine, taurine, and glucuronolactone in energy drinks are limited to 150 mg/L, 800 mg/L, and 20 mg/L, respectively [4]. This is justified on the basis that very severe adverse health effects have been reported with energy drink usage [5,6]. These effects can be particularly dangerous when such drinks are used with other products, such as alcohol [2]. Despite this, it is becoming popular to consume energy drinks and alcohol together [7-9]. We, therefore, aimed to explore how pre-clinical medical students perceive and consume energy drinks.

Materials and Methods

This descriptive study was carried out in September 2016 among pre-clinical medical students attending a public university in Istanbul, Turkey. The study population comprised 350 students studying at first or second class of the school of medicine. We did not use a sampling method because we aimed to reach all students. Finally, 161 pre-clinical medical students present at the time of the current study and who agreed to participate were included. After excluding missing data, 150 questionnaires were considered valid for data analysis.

Data was collected using face-to-face interviews with a questionnaire containing 28 questions. The questionnaire was prepared by researchers in the context of literature. Although, the questionnaire was not a scale, it included questions on knowledge and attitude about energy drinks. Questions covered

Ercan Kulak (✉), Seyhan Hidiroglu, Emel Luleci, Melda Karavus
Department of Public Health, School of Medicine, Marmara University,
Maltepe, Istanbul, Turkey
e-mail: ercan.kulak@marmara.edu.tr

the students' sociodemographic characteristics, personal habits (e.g., smoking and alcohol consumption), perception and usage of energy drinks, and experience of side effects. To distinguish energy drinks from other beverages, students were asked to name the brand name of one energy drink.

The questionnaire was pre-tested on 10 pre-clinical medical students attending another medical school at another district of Istanbul. The purpose of the pre-test was to see if the questions could be easily understood by the students and, if necessary, to make changes on wording.

Marmara University, School of Medicine Ethics Committee approval was obtained on 15.07.2016 with protocol code 09.2016.421 and written informed consent from each healthy volunteer were obtained prior to the investigation. We used chi-square tests to compare categorical data, and statistical significance was defined as $p < 0.05$.

Results

The mean age of participants was 21.27 ± 1.37 (range: 19–28) years, and 54.0% (n: 81) were females and 46.0% (n: 69) were males. Nearly, 38.0% of the participants (n: 57) reported that they lived with their family, 34.0% (n: 51) with their friends, 14.0% (n: 21) lived alone, and 14.0% (n: 21) lived in student dormitories (Table I). Overall, 69.3% (n: 104) had never smoked, 7.4% (n: 11) were ex-smokers, and 23.3% (n: 35) were current smokers. 50.7% (n:76) of participants had never used alcohol. Most participants (88.7%, n: 133) reported that they did not have a chronic illness (Table I).

Regarding energy drink consumption, 68.0% (n: 102) reported that they had used an energy drink at least once in their lives (Table II). Among those 102 students, 31.0% (n: 32) stated that they had used an energy drink only once and 69.0% (n: 70) had used energy drinks more than once. Of those who had used energy drinks, 53.9% (n: 55) consumed them "seldom or less than once a month." Among the ever-users, 53.9% (n: 55) were undecided about whether the taste or properties of the drinks needed to be improved; furthermore, 68.6% (n: 70) stated that they had not been affected by the advertisements of energy drinks (Table II). Of the 150 participants, 44.0% (n: 66) had acquaintances who consumed energy drinks (Table II), and 77.3% (n: 51) of the participants having such acquaintances had used energy drinks themselves, too. By contrast, among the participants who had no such acquaintances, fewer had consumed energy drinks (60.7%, n: 51). This difference was statistically significant ($p < 0.05$) (Table III).

Among smokers, 97.1% (n: 34) had used an energy drink at least once, compared with 59.1% in non-smokers ($p < 0.001$) (Table III). Also, 85.1% (n: 57) of those who consumed alcohol had also consumed an energy drink at least once in their lives, compared with only 54.2% (n: 45) among those who had not consumed alcohol ($p < 0.001$) (Table III). Significantly, more males (79.7%) had used energy drinks at least once compared with females (58.0%) ($p < 0.05$) (Table III). Approximately, 11.4% (n: 4) of the smokers (n: 35) consumed energy drinks together with cigarettes. Among all participants, 18.7% (n: 28) consumed both cigarettes and alcohol. Of those consuming both cigarettes and alcohol, almost all of them (96.4%, n: 27) had tried the energy drinks at least once in their lives. Among cigarette and alcohol consumers 7.1% (n: 2) and 32.1% (n: 9) consumed energy drinks with cigarette and alcohol, respectively ($p < 0.001$) (Table III).

The reasons medical students gave for consuming energy drinks are summarized in Table IV with 22.6% using them before exams, 20.6% before a sporting activity, 13.7% to relieve fatigue, 29.4% with alcohol, and 48.0% out of curiosity. Approximately, 82.0% of all participants perceived that energy drinks could have side effects, seventeen of the 102 ever-users reported that they had experienced side effects. The most frequent side effect they reported was palpitations (n: 12); other side effects were sleep disturbances, gastric pain, fatigue, and pain around the heart. Interestingly, 46.0% believed that energy drinks should not be sold to individuals under a certain age, 20.9% thought that they should only be sold in certain markets, 13.7% thought they should be banned, and 13.0% thought that advertisements should be restricted.

Table I. The socio-demographic characteristics, smoking and alcohol usage habits of participants (n=150)

Characteristics	Categories	n	%
Sex	Male	69	46.0
	Female	81	54.0
With whom he/she resides	Family	57	38.0
	Friends	51	34.0
	Dormitory	21	14.0
Smoking	Alone	21	14.0
	Never used	104	69.3
	Ex-user	11	7.4
Alcohol usage	Current user	35	23.3
	Never used	76	50.7
	Ex-user	7	4.7
Presence of chronic disease	Current user	67	44.6
	Present	17	11.3
	Absent	133	88.7

Table II. Perception and consumption of energy drinks among participants

		n	%
Having experienced an energy drink (n:150)	Yes	102	68.0
	No	48	32.0
Having a family member or a friend consuming energy drink (n:150)	Yes	66	44.0
	No	84	56.0
Prior consumption of energy drink (n:102)	Once	32	31.0
	More than once	70	69.0
Frequency of energy drink consumption (n:102)	Experienced only once	32	31.0
	Seldom-less than once a month	55	53.9
	Frequent-more than once a month	15	15.1
Would you like the taste/properties of energy drinks to be improved? (n:102)	Yes	14	13.7
	No	33	32.4
	Indecisive	55	53.9
Do you perceive that you are affected by energy drink advertisements? (n:102)	Never affected	70	68.6
	Sometimes affected	28	27.5
	Frequently affected	4	3.9

Table III. Experience of energy drinks according to acquaintances, sex, smoking and alcohol consumption

		Having experienced energy drink before				p-value*
		Yes (n:102)		No (n:48)		
		n	% †	n	% †	
Having a family member or a friend consuming energy drink	Yes (n:66)	51	77.3	15	22.7	0.03
	No (n:84)	51	60.7	33	39.3	
Current smoker	Yes (n:35)	34	97.1	1	2.9	<0.001
	No (n:115)	68	59.1	47	40.9	
Current alcohol user	Yes (n:67)	57	85.1	10	14.9	<0.001
	No (n:83)	45	54.2	38	45.8	
Sex	Male (n:69)	55	79.7	14	20.3	0.005
	Female (n:81)	47	58.0	34	42.0	
Current user of both alcohol and cigarettes	Yes (n:28)	27	96.4	1	3.6	<0.001
	No (n:122)	75	61.5	47	38.5	

† Column percentage

*Chi-square test was used. p value was taken as <0.05 as statistical significance level

Table IV. The reasons for consuming energy drinks

		n	%
Curiosity	Yes	49	48.0
	No	53	52.0
With alcohol	Yes	30	29.4
	No	72	70.6
Before exams	Yes	23	22.6
	No	79	77.4
Before a physical activity	Yes	21	20.6
	No	81	79.4
Relieve fatigue	Yes	14	13.7
	No	88	86.3

Discussion

We found that 68.0% of pre-clinical medical students had used an energy drink. This percentage was higher than the 51.4%, reported by Hidiroglu et al., among medical students of the same school conducted about five years ago in Istanbul [4]. Our study was meaningful showing the increase of energy drink consumption in the similar population after five years. This increase can be explained by the overall increase worldwide [1] and by the increase in energy drink advertisements in Turkey, such as TV advertisements, market advertorials, and sports advertisements. Similar findings were reported in a study by Lodz University Medical Faculty in 2015 [10]. In our study, 32.0% of our students did not consume an energy drink. This finding was lower when compared to the finding (46.0%) of the study by Cabezas-Bou et al., among mostly Hispanic college students [11]. Increased energy drink consumption was also reported in a cohort study of college students at a public university in the USA [12].

An important finding of our study was that current smokers and alcohol users had particularly high rates of energy drink usage. This was similar to the finding by Attila et al., who showed that energy drink consumption was higher among Turkish university students who consumed alcohol [13]. Also, Şen et al., reported that Turkish university students who smoked or consumed alcohol tended to use energy drinks more [14]. Another study in Turkey, by Hidiroglu et al., also showed that alcohol consumption was frequently seen in combination with energy drink consumption among medical students [4]. Arria et al., also showed that smoking, alcohol, and drug use were common among those who consumed energy drinks [12]. In the USA, Velazquez et al., reported that alcohol and energy drink consumption were correlated among university students [14]. We also showed that significantly more males had

used energy drinks compared with females. Similarly, Şen et al., and Velazquez et al., both showed that more males consumed energy drinks compared with females [14,15]. In our study, although a significant proportion of those consuming alcohol had tried energy drinks at least once, a small proportion of them consumed energy drinks with alcohol. This might suggest us that alcohol users consume energy drinks at different times and for different reasons.

We inquired as to the reasons for energy drink use. The main reason was “due to curiosity,” with students stating that they “were curious about the energy drink’s taste and how it feels like to drink it.” Similar results were obtained in the study by Attila and Çakir in Turkey [13]. A study by Reid et al., of youths and young adults in Canada also reported curiosity about the taste and experience, with the fact that it was a new beverage being the main reason for consumption [16]. In the present study, the second most common reason for consuming an energy drink was to use it with alcohol, similar to Attila and Çakir’s findings [13]. Other reasons for energy drink usage were to increase brain function before exams, to increase strength before sports, and to relieve fatigue. In Chuda’s study conducted among medical students at Lodz University, similar results were obtained [10]. However, in a Canadian study, energy drinks were also used by young people to help them lose weight and keep fit [16].

A high proportion of participants in our study were aware that energy drinks could have side effects, which conflicted with the findings of Şen et al., who reported that most university students were unaware of potential side effects [15]. Moreover, around one-fifth of the students in our study who had used an energy drink at least once reported some type of side effect, with palpitation being the most frequent. Hidiroglu et al., and Chuda, also reported that palpitation was the most frequent side effect [4,10]. The current literature indicated that caffeine, and to some extent taurine, were responsible for most adverse heart effects [17,18]. However, our participants also reported sleep disturbances, gastric pain, fatigue, and pain around the heart, similar to those reported by the participants of Hidiroglu’s study [4]. In other studies, adverse health effects of energy drinks had included insomnia, lower blood glucose levels, seizures, behavioral disorders, exacerbated bleeding diathesis, attention disorders, and anorexia nervosa [5,6,17].

There are limitations of our study. Firstly, our participants were pre-clinical medical students who might be aware of the health consequences of energy drink use and therefore consume

these drinks less. Indeed, we cannot generalize our findings to university students attending other faculties. Secondly, we do not know whether the first consumption of energy drink was before or after the first cigarette and/or alcohol consumption. Furthermore, our study used a quantitative design; qualitative studies with in-depth interviews might be needed to elaborate the perceptions of energy drinks, including the side effects experienced and expected and the reasons for consumption among young people.

Conclusion

In the current research, most participants tried energy drinks out of curiosity, and most had used an energy drink more than once. It was also quite common for students to consume energy drinks with alcohol. However, although there have been many reports of the side effects of energy drinks, awareness of this issue was incomplete. This is important because the use of caffeine-containing beverages beyond the specified upper limit can cause side effects, including death in severe cases. For this reason, we recommend that energy drink consumption should be discouraged and that sufficient and appropriate inspections should be carried out, especially by the relevant ministries. Case studies could provide important data about the adverse health effects of energy drinks. Finally, there is a need for follow-up studies that closely monitor the pattern of energy drink consumption by young adults.

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