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Research Article / Araştırma Makalesi

Energy Drink Consumption, Perceived Stress and Sleep Quality Among Health Science Students

Sağlıkla İlişkili Alanlarda Öğrenim Gören Üniversite Öğrencilerinde Enerji İçeceği Tüketimi Algilanan Stres ve Yaşam Kalitesi

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Abstract: The aim of this study was to analyze energy drink consumption, perceived stress and sleep quality among health science students. This cross-sectional study was conducted at the faculties of Medicine, Dentistry and Health Science in 2017–2018 with the participation of 2095 students.The data were gathered using a questionnaire as well as Perceived Stress Scale and Pittsburg Sleep Quality Index. Energy drinks were consumed by as many as 1255(%59.9) respondents. Energy drink consumption was more common among men, above 21 years, smokers, alcohol and coffee drinkers and believing that energy drinks are not addictive. In the 13.8% of the study group who consumed energy drink stated that they had experienced a health complaint while consuming energy drink and the most frequently reported health complaints were palpitations and the other complaints were frequent urination, insomnia. Energy drink consumption is prevalent among health science students. There was no significant difference between mean scores of the Perceived Stress Scale of the students who consumed and not consumed energy drinks in the study and the Pitssburg Sleep Quality Index. There is a need to raising awareness about energy drink's potential health effects.

Key Words: Energy drink; perceived stress; sleep quality

Özet: Bu çalışmanın amacı sağlıkla ilişkili alanlarda öğrenim gören üniversite öğrencilerinde enerji içeceği tüketimi, algılanan stres ve uyku kalitesinin incelenmesidir. Çalışma 2017-2018 akademik yılında Tıp, Diş Hekimliği ve Sağlık Bilimleri Fakültelerinde öğrenim görmekte olan 2095 öğrencide gerçekleştirilen kesitsel tipte bir araştırmadır. Çalışmanın verileri Algılanan Stres Ölçeği ve Pittsburg Uyku Kalitesi indeksini de içeren bir anket form ile toplandı. öğrencilerin 1255'i(%59.9) enerji içeceği tükettiğini bildirdi. Enerj içeceği tüketimi erkeklerde, 21 yaşından büyüklerde, sigara içenlerde, alkol ve kahve tüketimi olanlarda ve enerji içeceklerinin bağımlılık yapıcı etkisinin olmadığı düşünenlerde daha sıktı. Enerji içeceği tüketenlerin %13.8'si enerji içeceği tüketirken sağlık şikayeti yaşadığını bildirirken; en sık bildirilen sağlık şikayetleri çarpıntı, sık idrara çıkma ve uykusuzluktu. Enerji içeceği tüketiminin üniversite öğrencilerinde oldukça sık olduğu görüldü. enerji içeceği tüketenler ve tüketmeyenler arasında Algılanan Stres Ölçeği ve Pitssburg uyku kalitesi indeksinden alınan puanlar arasında bir fark saptanamadı. Enerji içeceklerinin potansiyel sağlık etkileri arasında farkındalık oluşturulmasına ihtiyaç olduğu düşünüldü.

Anahtar Kelimeler: Enerji içeceği; algılanan stres; uyku kalitesi

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1. Introduction

Energy drinks(ED) took place in the market in the 1960s, which are beverages including carbohydrates, caffeine and various combinations of many chemical substances. ED were initially perceived as a food supplement that helps reduce the fatigue of those who consume it. In recent years, it has been consumed for staying awake, increasing attention and life energy, improving performance in sport and mental activities(1). Consumption of ED has been increased dramatically in the last few decades, particulary among university students. According to some studies conducted in university students, consumption of ED varies between 32% and 86%(2-6). Market size of ED is also increasing day by day. In Western Europe, the margin of ED reached over 10% in a short time. ED consumption is estimated to be over 6 billion liters at global level(7). ED may lead to many health problems due to the sympathomimetic effects of many active chemical substances contained (2, 7). ED consumption is related with high anxiety levels and low sleep quality(8, 9). Although consumption is widespread among students studying in the medical field in Italy, the negative effects of ED on health are not well known(7).

The aim of the present study is to evaluate ED consumption, perceived stress and sleep quality in health science students.

2. Material and Methods

The study is a cross-sectional study conducted on university students studying at three different faculties (Faculty of Medicine, Dentistry and Health Science) of Eskişehir Osmangazi University in the academic year 2017-2018.

Eskişehir Osmangazi University, is a city with two major state universities in west of Turkey. Eskişehir Osmangazi University has 11 faculties, 4 vocational high schools and 5 institutes(10). There is a total of 23667 students enrolled in Eskişehir Osmangazi University(11). Education and training activities of university are given in four campuses placed in the center of Eskişehir Osmangazi University (12). The study was carried out in one settlement.

There are a total of 2912 students belong to health related faculties(1425 in the Faculty of Medicine, 295 in the Faculty of Dentistry and 1192 in Faculty of Health Science). A total of 1294/1425 students (90.80%) attended from Faculty of Medicine, 253/295 students (85.76%) attended from Faculty of Dentistry and 548/1192 students (45.97%) attended from Faculty of Health Sciences to the study. During the study, 2095 (71.94%) students who were in schools and agreed to participate in the study constituted the study group.

For the purpose of the study, a questionnaire form was prepared by literature review (3-5, 7, 13). The questionnaire consists of three parts. The first part contains socio-demographic characteristics and the items tought to be related with energy drink consumption. The second part contains items of the Perceived Stress Scale(PSS), and the third part contains items of the Pittsburg Sleep Quality Index(PSQI).

It was reached out with the adminstrators of schools for appointment on timing of the study. On the day and time of the meeting, students were gathered in their classes. Students have been informed about the subject and purpose of the study and who have agreed to participate in the study. The attendees who have agreed to participate in study have been verbalised. The questionnaire forms were distributed to the students and were filled in by the students with observation. This process took approximately 20-25 minutes.

The Perceived Stress Scale was used to assess student's stress levels. This scale was developed by Cohen and colleagues in 1983, validity and reliability study of Turkish version was made by Eskin et al in 2013(14, 15). The scale consists of 14 questions with 5 likert type. It is defined as an increase in scale score means also increase in stress level.

The Pittsburgh Sleep Quality Index was used to assess sleep quality. This scale was developed by Buysse et al in 1989, validity and reliability study of Turkish version was made by Agargün et al in 1996(16, 17). The total score ranges from 0 to 21. Higher scores indicates impaired sleep quality.

Those who have consumed ED at least once before have been considered as consuming ED. At least one regular smoker per day was considered smoking(18). At least 5 days a week for at least 30 minutes of regular physical activity was evaluated as having regular exercise. In this study, the family income level of the students was evaluated according to their own perceptions. Those who report that they are fussy, enthusiastic, hasty have A type, and those who reported that they were quiet, calm, patient had a B type personality.

Statistical analyses

Statistical analyses were performed with the SPSS 15 for Windows software. Chi-square and Mann-Whitney U tests were used for the analyzes. It is accepted significant if $p \leq 0.05$.

Ethical approval

All study procedures were approved by the Ethics Committee of Eskişehir Osmangazi university(29.03.2018/ 25403353-050.99-E.33260/81).

3. Results

The study group consisted of 2095 students, 1294 from the Medical Faculty, 253 from the Dental Faculty, and 548 from the faculty of Health Sciences. Their age ranged from 17-30 years with a mean of 21.3 ± 2.0 years. Of the students in the study group, 847 (40.4%) were male; 2074 (99.0%) were single. ED were consumed by as many as 1255(%59.9) respondents. The distribution of the socio-demographic characteristics of participants is given in table 1, according to whether or not the students consumed ED

Table 1. Distribution of socio-demographic characteristics of participants according to whether or not they consumed energy drink

Characteristics	Energy drink consumption			Test value
	No (%)*	Yes (%)*	Total (%)**	χ^2; p
Gender				
Male	257(30.3)	**590(69.7)**	847(40.4)	**56.309;<0.001**
Female	583(46.7)	665(53.3)	1248(59.6)	
Age(year)				
17-20	371(44.5)	463(55.5)	834(39.8)	**11.112;0.001**
≥21	469(37.2)	**792(62.8)**	1261(60.2)	
Family income				
Bad	37(50.0)	37(50.0)	37(50.0)	3.322;0.190
Moderate	627(40.0)	941(60.0)	941(60.0)	
Good	176(38.9)	277(61.1)	277(61.1)	
Total	840(40.1)	1255(59.9)	2095(100.0)	

*: according to the sum of the lines; **: Percentage by column sum.

Of the students consuming ED reported that they live as 460 (36.7%) alone, and 246 (19.6%) with their family / relatives and 549 (43.7%) with their friends (p = 0.067). Among the students who reported that they consumed ED, the average age of consumption for the first time was 15.4 ± 2.8. Of the participants, 651 (51.9%) of the consumers and 371 (44.2%) of non-consumers identified their personality type as A(p = 0.001). Table 2 shows the distribution of some personal characteristics and habits

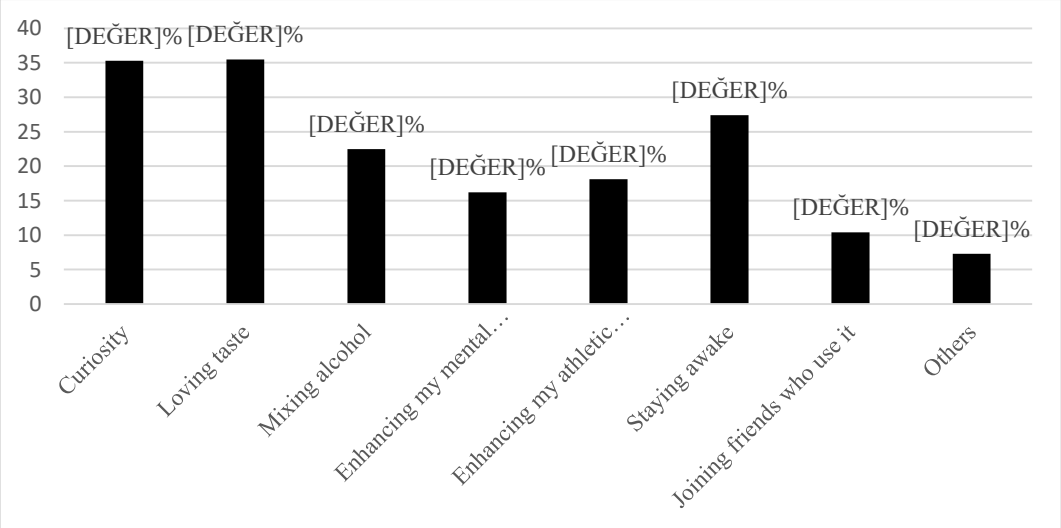
according to whether students in the study group consume energy drinks or not.

Table 2 . Distribution of personal characteristics and habits of participants according to whether or not they consumed energy drink

Characteristics	Energy drink consumption			Test value
	No (%)*	Yes (%)*	Total (%)**	χ^2; p
Resident				
Alone	**271(37.1)**	**460(62.9)**	**731(34.9)**	5.396;0.067
With family/relatives	**161(39.6)**	**246(60.4)**	**407(19.4)**	
With friends	**408(42.6)**	**549(57.4)**	**957(45.7)**	
Personality type				
A type	**371(36.3)**	**651(63.7)**	**1022(48.8)**	**11.959;0.001**
B type	**469(43.7)**	**604(56.3)**	**1073(51.2)**	
Regular exercise				
No	**505(42.0)**	**697(58.0)**	**1202(57.4)**	**4.318;0.038**
Yes	**335(37.5)**	**558(62.5)**	**893(42.6)**	
Smoking				
No	**692(47.8)**	**757(52.2)**	**1449(69.2)**	**114.843;<0.001**
Yes	**148(22.9)**	**498(77.1)**	**646(30.8)**	
Alcohol				
No	**650(50.8)**	**629(49.2)**	**1279(61.1)**	**157.269;<0.001**
Yes	**190(23.3)**	**626(76.7)**	**816(38.9)**	
Coffee				
No	**228(45.3)**	**275(54.7)**	**503(24.0)**	**7.545;<0.006**
Yes	**612(38.4)**	**980(61.6)**	**1592(76.0)**	
Tea				
No	**129(42.0)**	**178(58.0)**	**307(14.7)**	**0.554;0.457**
Yes	**711(39.8)**	**1077(60.2)**	**1788(85.3)**	
Soft beverages				
No				**34.985;<0.001**
Yes	**569(45.3)**	**688(54.7)**	**1257(60.0)**	
	271(32.3)	**567(67.7)**	**838(40.0)**	
Family member / friend consuming energy drink				
No	**464(45.7)**	**552(54.3)**	**1016(48.5)**	**25.516;<0.001**
Yes	**376(34.8)**	**703(65.2)**	**1079(51.5)**	
Thinking that energy drinks are addictive				
No	**136(20.9)**	**514(79.1)**	**650(31.0)**	
Yes	**288(49.4)**	**295(50.6)**	**583(27.8)**	**144.409;<0.001**
No idea	**416(48.3)**	**446(51.7)**	**862(41.2)**	
Total	840(40.1)	1255(59.9)	2095(100.0)	

*: according to the sum of the lines; **: Percentage by column sum.

The reasons for consumption by students who consumed ED in study, were mentioned as the most frequent reason to curiosity and loving taste, then to mix with alcohol, to increase mental and physical performance, to stay awake, to joining friends who use it and other reasons. Percentage distributions of energy drink consumption expenditure of students consuming energy drink are given in graph 1.



Graph 1. Percent distribution of energy consumption expenditure of students consuming energy drink.

*** The graph was created according to the responses given by students because of more than one option marking.

Of the consumers 357 (28.4%) in the study group stated that they have consumed in the last month. Consumers reported that they consume ED as 251(20.0%) drink with smoking cigarettes, 365 (29.1%) mix with alcohol, 35 (2.8%) drink with coffee, 77 (%6.1) with foods, 198 (%15.8) drink while doing sports. For students consuming ED, the average number of boxes consumed in starting was (min-max) 1.1 ± 0.4 (1-8).

In the study group, 178 (13.8%) of the students who consumed ED stated that they had experienced a health complaint while consuming ED and the most frequently reported health complaints were palpitations (37.1%) and the other complaints were frequent urination (22.3%), insomnia (19.7%), , headache (10.4%), anxiety (7.8%) and other complaints (2.6%).

There was no significant difference between mean scores of the PSS of the students who consumed and not consumed ED in the study and the PSQI($p > 0.05$). The score average (min-max) from the PSS and PSQI of the students are given in Table 3.

Table 3. Distribution of scores from the Perceived Stress Scale and the Pittsburg sleep quality index according to whether or not the students in the study group consume energy drink

Variables	Energy drink consumption		
	No Median(min-max)	Yes Median(min-max)	p
Percieved Stress Scale	28(3-56)	28(4-56)	0.933
Pittsburg Sleep Quality Index	6(0-17)	6(0-18)	0.260

4. Discussion

In recent years, increasing consumption and harmful effects to potential health have made ED an important public health problem(19).

ED started to be sold in the 1960s and their consumption became increasingly popular over the years. It is stated that the amount of globally consumed ED has almost doubled between the years 2003 - 2008(2). Marketing strategies focused on stimulating, attention and performance-enhancing effects of ED increase consumption especially in young and male populations(19). The frequency of consumption in the study group is higher in males than females. According to studies conducted among university students in various countries, this frequency has been reported to vary between 32.6-86.2%(3-6). In some studies, it has been reported that ED consumption is more frequent in males as like as our study(3, 4). Yun and his colleagues reported that there was no difference in the consumption of ED between the gender(5). In college students the recognition of energy drinks as a legal stimulant has been reported to increase the consumption by increasing the stress level of the students, especially during the exam periods, and the high academic expectation. The more widespread consumption of ED among males can be explained by the greater involvement of males in sports that require power(6, 9, 19).

Aggressive marketing strategies and their focus on young people results as consuming ED at early age(19). ED consumption in the study was found to be more frequent in people over 20 years old. Casuccio and colleagues have reported similar results as ours in their study conducted on medical students(7). In some studies performed in students in various countries, it is reported that there is no difference between age groups and consumption of ED(3, 13, 20). The approach of graduation with age progression, homework and responsibilities such as finishing projects raises the levels of anxiety in students and may play an important role in the increase of energy ED(3).

Personality, which is frequently mentioned in research related to stress, is used to describe the behavioral patterns of individuals. In A type personality pattern, there is a more competitive, aggressive and competing attitude. It is known that persons of type A personality have responded to life events more anxiety and interpret normal life events as worrying events. Moreover, it has been reported that people with type A personality patterns use less effective stress management methods(21). In our study, the frequency of consuming ED was found to be more frequent in those who regarded themselves as having Type A personality. Studies that examine the factors that may be related to consumption of ED focus more on the sociocultural characteristics of people, our study that investigates the relationship between personality structure and ED consumption is one of rare studies.

The effect of ED on physical strength is known in sports players by increasing aerobic endurance and anaerobic performance of high carbohydrate (mostly glucose) and caffeine contents(1). It is usual for sportsmen to want to take advantage of this positive effect. In this study, it was observed that the frequency of consumption was more frequent in those

who exercise regularly. Similarly, some studies have reported increased consumption of ED as the intensity of the student's exercise increased(20, 22). Haesun Yun and colleagues with Nowak and colleagues reported that there was no difference between exercise and ED consumption(5, 23).

Although it is known that consumption of ED is related to sociocultural factors, it is also thought to be closely related to environmental and behavioral factors, especially consumption of cigarettes, alcohol, coffee and soft drinks(1, 3, 20). While there was no difference between daily tea consumption and ED consumption in our study, consumption of ED was found to be more frequent in those who consumed cigarettes, alcohol, daily coffee and sparkling beverages. In studies conducted in various countries, it has also been reported that ED consumption is more common in people consuming cigarettes and alcohol(13, 24). In addition to addictive substances like cigarettes and alcohol; consumption of ED may also be associated with other addictive stimulants, behavioral disorders and risky health behaviors(20). Similar to our study, in a study done by Şen and his colleagues on students found that consumption of ED is more common in individuals who usually drinks coffee, and nearly half of these individuals consumed ED. In the study conducted by JinSukRa et al., It is reported that 9 out of 10 energy drinker students consume gaseous and sweet drinks(3, 22). The fact that ED are sweetened with high doses of caffeine and glucose, having the taste of coffee and sparkling beverages as a taste, and the sales of such drinks beside beverages in markets can be one of the reasons for consumption together.

The ingredients are known to be an important factor in consumption of this drinks(25). In particular, the addictive effect of caffeine and other stimulants, which are present in the range of 24-505 mg per box, is a possible health risks(20). It was seen that about half of the students in the study group (41.2%) had no idea about the addictive effect of ED and those who think that ED are addictive are less likely to consume energy drinks. Similarly, in the study of Şen and his colleagues, it is reported that about half of the students (43.6%) doesn't have an idea about this effect(3). In a study by Attila et al., It is reported that very few of the students who do not consume ED doesn't consume because of this risk(26). Increased awareness about potential adverse effects, as we have observed in our work, limits ED consumption; the absence of warning letters as much as harmful effects on boxes may decrease consumption.

The common reasons for consumption were loving taste, staying awake and mixing with alcohol among the energy drinkers in the participants. While Reid and his colleagues found that consumption of ED in almost half of the students in the study is increasing energy, staying awake; and in the study performed by Haesun Yun and colleagues, the most common basic reasons for consuming ED are reported as staying awake and relieving fatigue (5, 6). In our study mixing ED with alcohol is seen as a common consumption cause. In some studies similar to ours, it has been reported that this frequency varies between 11.2% and 24% among students (11, 31). One of the most reason consumption of ED with alcohol is to compansate the effects of alcohol such as slowness in the perception and stunned feelings. In recent years, mixed ED with alcohol have been offered for sale. It has been reported that consuming with alcohol is consuming large quantities of alcohol and alcohol intoxication, dehydration due to natriuresis effect in both drinks and many other health problems (32, 33).

University students have irregular sleep patterns, daytime sleepiness, and quite common to be sleepless, especially during the exam periods. For students, consumption of ED is frequent in order to cope with them. The stimulating bioactive molecules in ED disrupt sleep quality by shortening sleep time and altering brain waves in the sleep cycle(8). In the study, there was no difference was found between the average scores of the students who consumed and who doesn't consume ED from the PSQI. Studies conducted in various countries among students show that sleeping quality of ED consumers is lower than others.(8, 27, 28).

Poor sleep quality adversely affects health and reduces academic achievement in students(28).

There is a two-way relationship between stress and ED consumption. It is known that the stressors of the students are closely related to their eating styles and as the stress level increases, students prefer more unhealthy foods. On the other hand, students with increased stress levels view ED as a way to cope with this(9). There was no difference between the scores obtained from the PSS of ED and others. Several studies have reported increased ED consumption in those with high stress levels(9, 29). However, the effects of ED on stress and sleep quality are closely related to the amount consumed. The lack of consumption to uncover this effect in the working group may have led to the lack of a difference in scores between those who consume ED and those who do not consume ED in the study.

Studies on ED consumption among students in Turkey is limited. Our study is one of the few studies that examines the ED consumption, stress and sleep quality in a large student population. Students who have consumed ED at least once during life in our work have been considered to have consumed energy drink; there is no accepted definition of consumption of ED. The inclusion of university students studying only in medical field may have led to a bias in the results of this study.

5. Conclusion

It was concluded that health education related to the effects of ED would be appropriate for those persons who will be role models in terms of health related behaviors for the society in their professional life. It was thought that comprehensive studies should be planned to examine the causality between ED, stress and sleep quality.

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