

Energy Drinks Consumption among Sarajevo High School Students Sample

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Abstract - Energy drinks are increasingly popular among adolescents. They are marketed to improve concentration and to reduce tiredness. Their consumption can deteriorate young people's physical and mental well-being, and it is important to implement appropriate preventive measures for protecting the health of young people. This research aimed to determine the frequency of energy drink consumption among high school students and to reveal their attitude towards the effects of energy drinks. A cross-sectional survey was conducted at Fifth gymnasium Sarajevo and Medical high school – Jezero, Sarajevo during May 2017. Ministry approved its conduction of Education, Science, and Youth of Sarajevo Canton. Data were collected from a sample of 495 students. School grade, gender, socioeconomic status (parental employment), and physical activity correlated with EDs consumption patterns. More than half of the respondents (61.62%) reported a defined energy drinks consumption pattern with no association with sample characteristics. There is a strong need for continuous education in the field of EDs with the aim and prevent health disorders of young people.

Keywords — energy drinks, consumption, adolescents, survey

Abbreviations

Energy drinks – Eds

EU – Europe Union

I. INTRODUCTION

EDs is a subcategory of non-alcoholic soft drinks. This category includes various beverages containing sugar and various combinations of ingredients supposed to "energize" the body and mind, most commonly caffeine, taurine, and vitamins [1]. The diffusion of EDs in the world started at the end of the 20th century, and since then, its consumption has increased dramatically, so EDs consumption has become one of the most notable trends in the soft drinks market [2]. During the 2003–2016 National Health and Nutrition Examination Surveys, dietary data were collected among adolescents (aged 12–19 years), young adults (aged 20–39 years), and middle-aged adults (aged 40–59 years). Analysis

of EDs trends revealed that the prevalence of EDs consumption on a typical day increased significantly for adolescents (0.2 percent to 1.4 percent), young adults (0.5 percent to 5.5 percent), and middle-aged adults (0.0 percent to 1.2 percent) [3]. EU-wide questionnaire-based survey was conducted between February and November 2012 to gather consumption data for EDs in specific consumer groups (adults, adolescents, and children) in the EU. Prevalence for consumption was 18% in children, 30% in adults, and 68% in the adolescent. The higher prevalence was in the 15-18 age group (73% of the total population) than in the 10-14 age group (55% of the total population). As for volumes, the average consumption was 2 L/month in adolescents [2].

EDs are marketed for their effects as stimulants, energizers, and performance enhancers, but frequent consumption of these beverages has been linked to negative health consequences, especially in youngsters. Primarily the health risks are related to caffeine content [4]. Caffeine is extracted from the raw fruit of coffee plants (*Coffea Arabica*), tea, kola nuts, and cocoa. Caffeine is quickly absorbed after ingestion. Increases in plasma concentrations are generally observed between 30 – 60 minutes following ingestion. Caffeine's half-life ranges from approximately 2 to 10 hours. Up 3.5% of its content is excreted unchanged in the urine, and select amounts are eliminated via sweat [5]. Caffeine is the most widely consumed central-nervous-system stimulant [6]. EDs contain modest to relatively high levels and caffeine concentrations (range: 50–505 mg caffeine/serving; 2.5–35.7 mg caffeine/oz) [7]. Increased caffeine consumption in children and adolescents results in increased blood pressure, sleep disturbances, headaches, and stomach aches. Adolescence is the time of maximum bone deposition. Caffeine interferes with the absorption of calcium in the small intestine and may impact bone acquisition. Reduction in calcium deposition may also be due to replacement calcium-containing drinks such as milk with EDs. In addition to physical effects, mental health effects due to consumption of EDs can include insomnia, problems with behavioral regulation, and poor lifestyle behaviors, such as poor diet [8]. Caffeine intoxication may result in palpitations, hypertension, diuresis, central nervous system stimulation,



nausea, vomiting, marked hypocalcemia, metabolic acidosis, convulsions, and in rare cases, also death.

There are likely to be longer-term health implications associated with high sugar content. Consumption of sugar-sweetened beverages under isocaloric conditions seems not to affect body weight. However, when they are consumed in addition to the normal diet, they provide excess calories. Consumption patterns of EDs correlate with nourished status [9]. Because of its calories contribution to the diet, it is considered to impact the epidemic of obesity [10,11].

EDs should not be marketed as sports beverages that deliver a rehydration benefit [12].

Advertising and brand loyalty have been highlighted as major influences on young people's attitudes towards Eds, with participants reporting seeing them advertised on TV, the internet, through games promotions, via sports sponsorship, and in shops. [13].

Promotion of EDs market and easy access expose young people to risk. Exploring EDs' presence in adolescents' life is necessary to implement a nutrition and health promotion program. This research aimed to determine the frequency of consumption of EDs among high school students and reveal their attitude towards the effects of EDs.

II. METHODS

A. Design and Sample

The study was designed as a cross-sectional survey conducted at Fifth gymnasium Sarajevo and Medical high school – Jezero, Sarajevo, during May 2017. A sample included 495 students who attended first and third class during the survey. Ministry approved the survey of Education, Science, and Youth of Sarajevo Canton. The research was performed in accordance with the Declaration of Helsinki [14].

B. Data Collection

Students completed a self-administered anonymous questionnaire that included questions related to variables: demographic (age, gender), socioeconomic (parental employment), engagement in sport, frequency of EDs consumption, perception of EDs consumption benefits, and side effects. The research variables were formulated in the form of questions with offered answers and open questions to which the respondents could enter the answers independently

C. Data Analysis

Registration of data was performed using the computer application Microsoft Excel 2013, while the analysis of data was made using the Statistical Package for Social Sciences

software (IBM, version 23.0). Results were expressed as percentages and means±standard deviations. To correlate EDs consumption patterns regarding gender, grade, engagement in sport, and parental employment, chi-squared analyses were conducted. Differences were considered statistically significant at $p < 0.05$.

III. RESULTS

A. General information of students participated in the study

A sample included 495 students, of which: 322 (65.05%) were female, and 173 (34.95%) were male, while 270 (43.84%) attended first grade and 278 (56.16%) attended third grade. The mean age of students participated in the study was 16.75 ± 1.09 year. Engagement in sport was reported by 229 (46.28%), and 28 (5.66) had both parents unemployed. General information is shown in table 1.

Table 1. General information of students participated in the study

Variable		Total
Number of students (%)		495 (100.0%)
Age (mean±SD)		16.75±1.09 year
Gender	Number of females (%)	322 (65.05%)
	Number of males (%)	173 (34.95%)
Grade	Number of first-grade students (%)	217 (43.84%)
	Number of third-grade students (%)	278 (56.16)
Engagement in sport	Number of students engaged in sport (%)	229 (46.28)
	Number of students not engaged in sport (%)	266 (53.72)
Employed parent	Number of the student with one employed parent (%)	216 (43.63)
	Number of the student with both employed parents (%)	251 (50.71)
	Number of the student with none employed parent (%)	28 5.66)

B. A comparative analysis of the use of energy drinks

EDs consumption frequency was compared to gender, grade, engagement in sport, and parental employment (Table 2).

In a sample of 495 students, 305 (61.62%) reported a defined EDs consumption pattern. There were no statistical differences in consumption regarding gender, grade, engagement in sport, and parental employment.

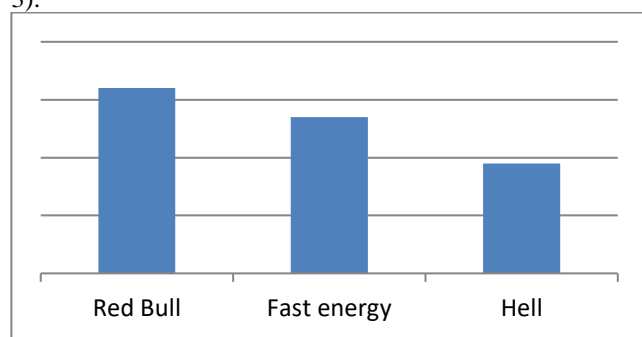
In all samples, 33(6.67%) students consumed EDs once a day, and 25 (5.05%) consumed EDs several times a day. Once a month was the frequency of EDs consumption at 81(16.36%) students and several times a week at 87(17.58%) students.

Table 2. Frequency of consumption of EDs

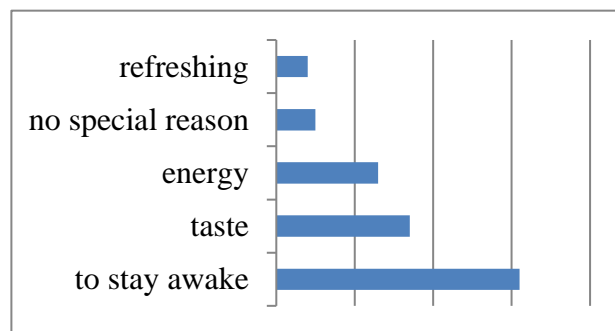
Frequency of EDs consumption		Sample characteristics									Total (305)	Proportion in sample 495 (100.00%)
		gender		grade		engagement in sport		employed parent				
		male	female	I	III	yes	no	one	both	none		
once a day	N	12	21	11	22	18	15	11	21	1	33	33
	%	11.11	10.66	8.87	12.16	12.95	9.04	8.80	12.73	6.67	10.82	(6.67%)
several times a day	N	8	17	12	13	13	12	14	10	1	25	25
	%	7.41	8.63	9.68	7.18	9.35	7.23	11.20	6.06	6.67	8.20	(5.05%)
once a week	N	31	48	37	42	29	50	24	50	5	79	79
	%	28.70	24.37	29.84	23.20	20.86	30.12	19.20	30.30	33.33	25.90	(15.96%)
once a month	N	22	59	25	56	35	46	32	44	5	81	81
	%	20.37	29.94	20.16	30.94	25.18	27.71	25.60	26.67	33.33	26.56	(16.36%)
several times a week		35	52	39	48	44	43	44	40	3	87	87
		32.41	26.40	31.45	26.52	31.66	25.90	35.20	24.24	20.00	28.52	(17.58%)
All	N	108	197	124	181	139	166	125	165	15	305	305
	%	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	(61.62%)
P		0.414		0.547		0.282		0.200				

A. *Used energy drinks, the reason for use and side effects*

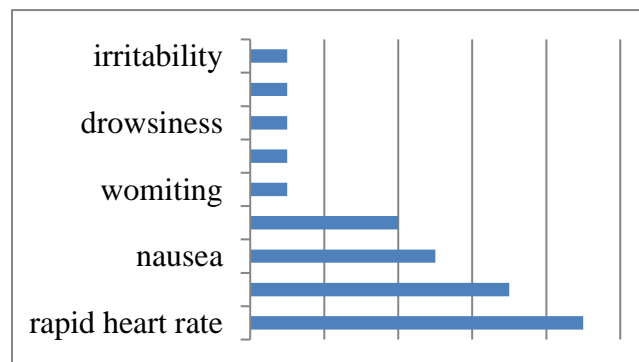
Students were asked to report the EDs they used (Graph 1), reasons for use (Graph 2), and observed side effects (Graph 3).

**Graph 1. Used EDs**

The most used energy drink is Red Bull, alone or in combination with others.

**Graph 2. Reason for EDs consumption**

Staying awake is the most common reason for the consumption of EDs.

**Graph 3. Side effects of EDs consumption**

Most students complained of rapid heartbeat, insomnia, nausea, and stomach upset.

IV. DISCUSSION

In a sample of 495 students, 305 (61.62%) reported a defined EDs consumption pattern. This proportion is in line with EDs consumption in the EU, which was 68%, varying from 48% in Greece to 82% in the Czech Republic [2]. There were no statistical differences in pattern of consumption regarding gender, grade, engagement in sport, and parental employment in our study. But in an EU study among male respondents, a higher prevalence of ED consumption was reported (74%) than among female ones (63%) [2].

In our sample, 6.67% of students consumed EDs once a day, and 5.05% consumed EDs several times a day. This proportion is higher than in an EU study that revealed that around 5% drinking EDs every day [2]. Several times a week was the frequency of EDs consumption at 17.58% of students. According to the EU study, 6% of adolescents drink ED 4-5 times a week, and 15% 2-3 times a week [2].

Red Bull was reported as the most popular ED. The second and third choices were Fast Energy and Hell. Red Bull was the most popular brand among adolescents in the EU, followed by Monster [2].

The main reasons for EDs consumption were to stay awake, taste, and energy. As for the reasons behind ED consumption, the most important ("first choice") among EU adolescents resulted in being the taste of the product, the need for energy, and the need to stay awake; also mentioned were consumption to enhance sports performance and to treat hangover [2].

In our study, most students complained of rapid heartbeat, insomnia, nausea, and stomach upset. Consumption of EDs has been associated with multiple medical complications, including anxiety, agitation, migraines, gastrointestinal upset, insomnia, arrhythmias, other cardiovascular complications, and in rare cases, even death. There are problems with behavior modification and cognitive capabilities in adolescents who use Eds [15].

V. CONCLUSIONS

The prevalence of EDs consumption among high school students is rising. There is a need for educational intervention to inform adolescents of the consequences of consuming these popular drinks. Policymakers should introduce regulatory policies on television food advertising to which youth are exposed.

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