

THE RELATIONSHIP BETWEEN THE CONSUMPTION OF FUNCTIONAL BEVERAGES AND THE USE OF OTHER STIMULANTS BY HIGH SCHOOL STUDENTS IN POLAND

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Abstract

Introduction: The results of national and international studies demonstrate the relationship of consumption of cola-type beverages by adolescents with increased dependence on other psychoactive substances, such as alcohol or tobacco.

Aim: To assess the relationship between consumption of cola and functional drinks (energy and isotonic drinks) and other stimulants including coffee, tea, alcohol and cigarettes in a group of high school students.

Material & methods: 120 students (16–17 years) attending upper secondary school in Lesko participated in the survey. The anonymous questionnaire collected data on frequency of consumption of selected products and beverages (FFQ), including functional beverages. To assess the differences between groups the Mann-Whitney U-test was applied, while the relationship between variables was analyzed using the Spearman correlation coefficient (*rs*) at statistical significance level $\alpha=0.05$.

Results: The results showed that sugar beverages such as cola (soft drink), were consumed most frequently by young people (2.50 ± 0.92). Of functional beverages, respondents choose energy drinks more often (2.07 ± 0.87) than isotonic beverages (1.66 ± 0.76). Among female respondents, a positive correlation between the consumption of energy drinks and cola drinks was found ($rs=0.34$, $p=0.0001$). Girls who smoke cigarettes reported consuming energy drinks significantly more often ($p=0.0212$) than non-smokers. The frequency of consumption of caffeinated beverages (cola and energizing drinks) in the surveyed group had no correlation with consumption of alcoholic beverages and tea.

Conclusion: Excessive intake of caffeine by young people may lead to increased use of other stimulants. This indicates a need for quantitative data on consumption of caffeinated beverages by adolescents.

Key words: energy drinks, caffeine, addiction, adolescents

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Introduction

In recent years, a large number of national and international studies demonstrated the use of stimulants [1,2,3]. Among the non-alcoholic drinks available at the market, a significant share is represented by functional drinks, including energizing and isotonic ones [4]. The popularity of energy drinks, especially among the youngsters (teenage learners) prompts reflection on the relationship between this age group and the use of stimulants. The aggressive advertising of

specific energy drinks and packaging designed to resemble a can of beer or other alcoholic drinks (alcopops), creates for consumers, especially teenagers, an association with other addictive substances. Some studies indicate a relationship between the consumption of energy drinks and addiction to other psychoactive substances, including one conducted with high school students in Poland [5]. The authors refer to American findings on the phenomenon called *co-occurrence of*

addictions — those already addicted to any psychoactive substance are at greater risk of addiction to others, compared with non-users. [6]. For consumers of energy drinks, another risk factor for addiction to other psychoactive substances may be the popularity (in the nightclubs or other places) of alcoholic drinks made from energy drinks. The paper presents results on energy drinks, isotonic, and cola-type drinks. Some nomenclature presented by producers and in the literature refers to “energetic drinks” instead of “energy drinks”. This is misleading, considering their effects, so the names cannot be used interchangeably [7]. Those who consume beverages from the group of functional drinks, including, i.a., isotonic drinks (used by individuals with increased physical activity) and energizing drinks (used to increase psycho-physical efficiency) may use both types of drinks interchangeably. Therefore our analysis includes both. Our objective: to assess the relationship between frequency of consumption of energy and isotonic drinks and the use of other stimulants including coffee, alcohol and cigarettes, in a group of the students of upper secondary school in Poland.

Material and methods

The survey was conducted among 120 students (16–17 years) of one of the upper secondary schools in Lesko (Subcarpathian Voivodeship). The students from first and second class from schools with different educational profiles have been invited to participate in the study.

All participants completed a series of tests, from anthropometric (height, weight, waist and hip circuits). Subsequently, they filled out anonymous questionnaires on the frequency of consumption of selected products, foods and beverages (including functional) to assess dietary behaviors. The adolescents were asked, among others, about the frequency of consumption of certain non-alcoholic beverages (including cola, energizing and isotonic drinks) and other beverages such as tea, coffee, and cocoa. The frequency of consumption was evaluated on a four-point scale (4 — every day, 3 — a few times a week, 2 — less than once a week, 1 — never). Participants were also asked about other stimulants — smoking, and drinking alcohol (including beer, wine, vodka). This addressed prevalence of smoking and alcohol consumption in the home environment, supervised by parents (or caretakers) of the subjects. Appropriate codes are assigned to

qualitative data obtained from the survey to enable quantitative analysis. Subsequently, the data are analyzed statistically using STATISTICA PL 10 (UJ license). To assess differences between the analyzed groups nonparametric Test Mann-Whitney U was used. Strength of association was tested by the Spearman rank correlation coefficient (r_s) at the accepted level of significance $\alpha = 0.05$.

Results

The study involved 120 students, 80 girls and 40 boys, from one high school in Poland. Average age of participants was 16.6 ± 0.5 years. Most came from rural areas (84.17%) of southern Poland. One of the first questions concerned the frequency of consumption of selected soft drinks (non-alcoholic), of which mineral water was the most frequently chosen non-alcoholic beverage (3.24%), followed by fruit juice (3.16%) and tea (3.11%). The remaining soft drinks recorded frequency below 3%. The results are presented in Figure 1, which shows the average frequency of consumption of selected soft drinks by the adolescents from upper secondary schools.

Among beverages containing caffeine, respondents most often choose sweet drinks, such as carbonated cola (2.75 ± 0.85). Statistically significant differences were also observed by gender with regard to consumption of energy drinks (2.51 ± 0.76 , $p = 0.0001$), isotonic drinks (2.13 ± 0.78 , $p = 0.0001$), vegetable juices (1.79 ± 0.81 , $p = 0.0479$) and water (3.54 ± 0.64 , $p = 0.0279$). The least willingly, young respondents from Lesko reached for a coffee (1.51 ± 0.62) or cocoa (1.57 ± 0.68). There were no gender differences in consumption of these drinks.

The adolescents were asked about using selected psychoactive substances such as cigarettes and alcohol. The majority (75%) admitted that they had tried alcoholic beverages. Boys tried alcohol 80% compared with 72.5% of girls. Nearly half of the respondents tried smoking cigarettes (46.6%): 48.7% of boys and 45.6% of girls. No statistically significant differences were found between genders.

Among the girls who had ever smoked cigarettes, a significant relationship with the consumption of energy drinks was found ($p = 0.0212$), compared with girls who had not smoked. (Figure 2).

Also in the group of girls was a positive correlation between consumption of energy drinks and of cola drinks ($r_s = 0.34$, $p = 0.0001$).

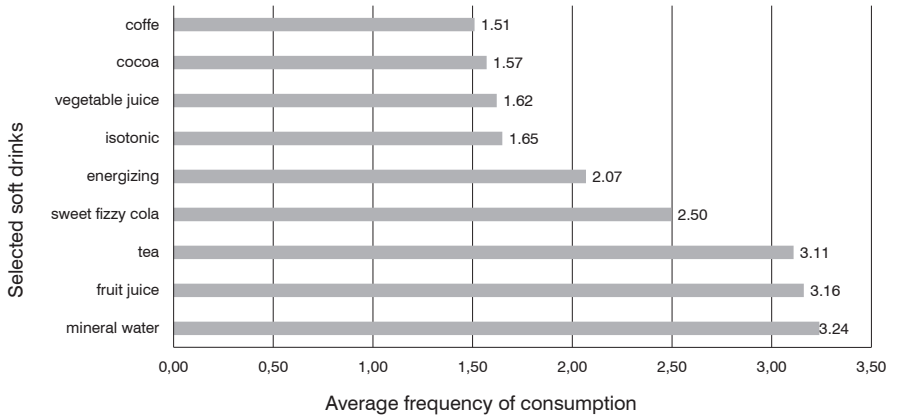


Figure 1. The average frequency of consumption of select soft drinks in the group total, n=120

Frequency consumption scale: Every day or more than once a day - 4, several times a week - 3, less than once a week - 2, never - 1

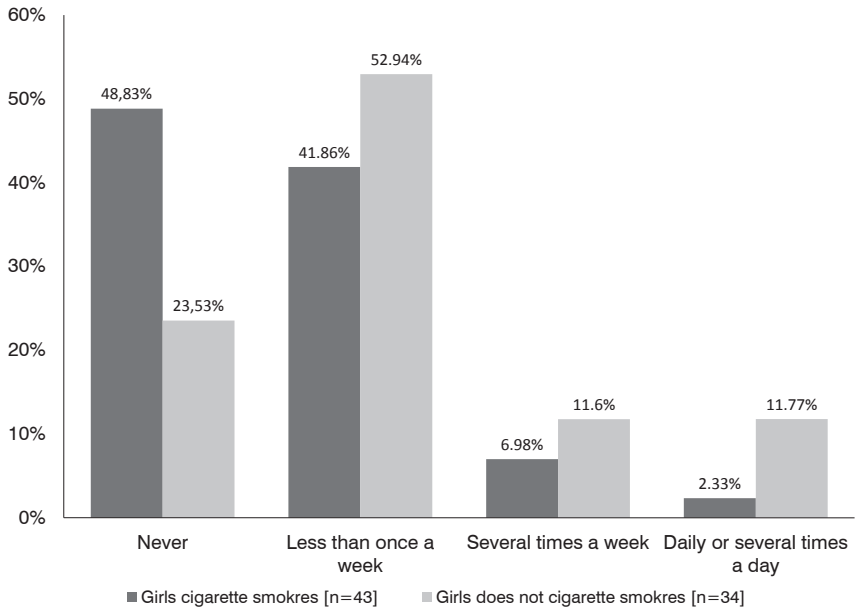


Figure 2. Frequency of consumption of energy drinks in the group of smokers and no-smokers girls. n - number of respondents

Table 1. Using the selected psychoactive substances such as cigarettes and alcohol by the study group in accordance to the gender

Alcohol consumption				Cigarette smoking			
Groups and abundance	Yes [%]	No [%]	p-value	Groups and abundance	Yes [%]	No [%]	p-value
All n = 120	75.00%	25.00%	$p = 0.2537$ (Chi ² test)	All n = 118	46.61%	53.39%	$p = 0.4492$ (Chi ² test)
Boys n = 40	80.00%	20.00%		Boys n = 39	48.72%	51.28%	
Girls n = 80	72.50%	27.50%		Girls n = 79	45.57%	54.43%	

Regarding other beverages, there was no statistically significant association between their consumption and the increased frequency of use of other stimulants, in the total group and with respect to gender.

Discussion

Among all soft drinks, young people in the survey consumed water and tea most frequently. The significant place of water in their diet is a positive example of healthy nutritional behaviors. Among the commonly known stimulants which can lead to addiction, the study included coffee and other beverages containing caffeine (cola drinks and energizing drinks). Of these, respondents most often reach for cola beverages and energy drinks. Coffee was the least frequently consumed caffeine-based product. This may reflect high popularity of cola and energy drinks in this age group [8,9]. The greater frequency of alcohol consumption than other addictive substances was observed for both genders. These results seem typical for the general adolescent population in Poland and are in line with other research in this area. According to the report from the HBSC 2010, the most common psychoactive product used by Polish teenagers is alcohol. The HBSC study showed that over 70% of teenagers declared consuming alcohol within 30 days of the survey. We observed that the number of students who try alcoholic beverages increases with age [10]. Another study carried out on a representative sample of 1100 male and female students age 16–19 in public secondary schools, and their parents, 53% of the respondents admitted to consuming alcohol (47% of girls and 64% boys) [11]. Such results are consistent with those obtained in our study.

Although the present study did not demonstrate the link between consumption

of caffeinated beverages and that of alcoholic drinks, such a relationship has been shown [1]. This showed that the consumption of energy drinks in a group of students is related to alcohol dependence. Similar conclusions, indicating increased risk of addiction for those who consume alcohol and energy drinks, have been reached elsewhere. [12]. Another addictive substance considered is tobacco. The results of the above mentioned study by [13], conducted on the representative sample of high school students, also demonstrated that as in our study, boys are more frequent users of tobacco products (cigarettes) than girls. Among the 14% of students who admitted to smoking cigarettes, 22% were boys and 10% were girls [13]. For comparison, some 50% of the respondents had declared to smoke cigarettes. [??] Similar results have been obtained by a study conducted in two secondary schools in another Polish city, Lublin. The researchers reported that smoking cigarettes was one of the major problems in these schools: 41% of teenagers reported smoking cigarettes [14]. Among the female students who had ever smoked cigarettes, a statistically significant relationship with the consumption of energy drinks was found ($p = 0.0212$), compared with non-smoking girls. The positive correlation between consumption of popular cola drinks, including energy drinks, and the prevalence of smoking by adolescents and young adults was also reported by Jaworski et al. (2013). The authors explained this phenomenon following Jons et al. (2003), who noted the desire to increase the nicotine effect [6,15].

The assortment and accessibility of products containing caffeine are still increasing. This may lead to consumption greater than the recommended safe level, particularly among young people. In recent years, an increase in the level of caffeine in adolescents' diet has been observed.

Almost all-98%-of the young people admitted to consuming at least one serving of a caffeinated drink daily. [16]. Research by Wierzbińska et al. (2010) on schoolchildren finds that both the average and maximum portion caused respectively 77% and 90% of children to have exceeded doses which may cause sleep disorders (1.4 mg/kg/day), while doses causing anxiety and fear (2.5 mg/kg/day) were exceeded by 46% and 73% of the respondents, respectively. As many as 39% of children, depending on the products consumed containing caffeine, ingested quantities greater than 300 mg/day [17]. Thus, the results of our study, showing a positive correlation between consumption of energy drinks and frequency of consumption of cola drinks ($rs=0.34$, $p=0.0001$) in the studied group of girls seem even more disturbing. Due to the growing consumption of caffeine, which has effects in proportion to amount, there is need for more studies assessing the amount of caffeine in young people's diets. Aspects related to the role of caffeine in so many diets should be included in health and nutrition educational programs for teenagers. The co-occurrence of dependency on other stimulants along with high doses of caffeine should be also addressed.

Conclusions

the results of the reported study support the following conclusions:

- Among soft drinks, mineral water beverages are favored the most
- Consumption of energy drinks, belonging to the group of functional beverages, was related to smoking among the female respondents.
- Excessive use of caffeine in young people's diets may lead to increased use of other stimulants.
- Further studies are needed to define more precisely the amount of caffeine in adolescents' diets.

Resumo

Enkonduko: La rezultoj de naciaj kaj internaciaj studoj pravas la rilaton de konsumado de kolao-tipaj trinkaĵoj inter adoleskantoj kun la pliigita dependeco de la uzado de aliaj toksikomaniaj substancoj, ekzemple alkoholo aŭ tabako.

Celo: Taksi la rilaton inter la ofteco de konsumado de kolao kaj funkcionalaj trinkaĵoj (energiaj kaj izotonaj trinkaĵoj) kaj la uzo de aliaj stimuloj inkluzive kafo, teo, alkoholo kaj fumado de tabako en grupo de mezgradlernejaj adoleskantoj.

Materialo & metodoj: 120 adoleskantoj de la aĝantag inter 16-17 jaroj partoprenis en la enketo en mezgrada lernejo en Lesko. Anonima enketilo estis uzita por kolekti datumojn pri la ofteco de konsumado de elektitaj produktoj kaj trinkaĵoj (FFQ), inkluzive de funkcionalaj trinkaĵoj. Por taksi la diferencojn inter grupoj estis aplikita la Mann-Whitney testo, dum la rilato inter variabloj estis analizita uzante la Spearman korelacian koeficienton (rs) je la statistika signifa nivelo $\alpha = 0.05$.

Rezultoj: La rezultoj montris, ke sukeraĵ trinkaĵoj kiel ekzemple kolao (senalkoholaĵo), estis konsumitaj de la adoleskantoj plej favore (2,50). El la funkcionalaj trinkaĵoj, la enketitaj junuloj elektis energiajn trinkaĵojn pli ofte (2.07) ol izotonajn (1,66). Inter la respondintaj knabinoj, troviĝis pozitiva korelacio inter la konsumo de energiaj trinkaĵoj kaj la ofteco de konsumo de kolao-trinkaĵoj ($rs = 0.34$, $p = 0,0001$). La knabinoj kiuj fumas cigaredojn deklaris konsumi energiajn trinkaĵojn signife pli ofte ($p = 0.0212$) ol ne-fumantaj knabinoj. La ofteco de konsumado de kafeinigitaj trinkaĵoj (kolao kaj energiigitaj trinkaĵoj) en la prienketitaj grupoj havis neniun influon sur la konsumado de etanolenhavantaj trinkaĵoj kaj teo.

Konkludo: Troa konsumado de kafeino en dieto de adoleskantoj povas konduki al la pliigita uzo de aliaj stimuloj. Tiel, estas bezono por la kvanta taksado de la konsumado de kafeinigitaj trinkaĵoj de adoleskantoj.

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