THE IMPACT OF SMOKING AND ENERGY DRINKS ON THE QUALITY OF LIFE OF STUDENTS

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The high prevalence of smoking and consumption of energy drinks among students is a significant medical and social problem. This study aimed to investigate the impact of these harmful habits on the quality of life of students of the Burdenko Voronezh State Medical University, and to assess their awareness of the risks associated with such bad habits. We invited 442 second- and third-year students from the medical, pediatric, and dental faculties to complete O.I. Gubina's Quality of Life Assessment questionnaire. Energy drink drinking was found to be more prevalent than smoking; male participants practiced these habits significantly more often than female. Electronic cigarettes were the most common form of nicotine consumption. We established significant correlations of smoking with respiratory symptoms (the closest — with cough, $r = 0.489$; $p < 0.05$), and consumption of energy drinks — with tachycardia ($r = 0.864$; $p < 0.05$), sleep disorders ($r = 0.251$; $p < 0.05$), and headache ($r = 0.217$; $p < 0.05$). The quality of life was significantly lower in the groups of students with harmful habits, and the median values were minimal when the said habits were combined, especially on the "Health" and "Spirituality and Healthy Lifestyle" scales. Despite the awareness of harm, a significant part of students do not intend to give up harmful habits. The results of the study emphasize the need to develop prevention programs aimed at risk groups, primarily young men and people with combined addiction.

Keywords: quality of life, students, smoking, energy drinks, harmful habits, lifestyle

Author contribution: the authors have made equal contributions to this publication.

Compliance with ethical standards: the study was consistent with the principles of biomedical ethics. The survey was anonymous, which ensured confidentiality of the information provided. Each participant submitted a signed informed consent form before the survey.

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ВЛИЯНИЕ КУРЕНИЯ И ЭНЕРГЕТИЧЕСКИХ НАПИТКОВ НА КАЧЕСТВО ЖИЗНИ СТУДЕНЧЕСКОЙ МОЛОДЕЖИ

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Высокая распространенность курения и употребления энергетических напитков среди студенческой молодежи представляет значительную медико-социальную проблему. Целью работы было изучить влияние указанных вредных привычек на качество жизни студентов Воронежского государственного медицинского университета имени Н. Н. Бурденко и оценить их осведомленность о связанных с этими вредными привычками рисках. В анонимном анкетировании приняли участие 442 студента 2–3 курсов лечебного, педиатрического и стоматологического факультетов. Были использованы авторская анкета и опросник «Способ оценки качества жизни» О. И. Губиной. Установлено, что среди студентов распространенность употребления энергетических напитков выше распространенности курения, при этом обе привычки значительно чаще отмечали у юношей. Наиболее часто встречающейся формой потребления никотина было использование электронных сигарет. Установлены значимые корреляции курения с респираторными симптомами (наиболее тесная — с кашлем, $r = 0{,}489$; $p < 0{,}05$), а употребления энергетических напитков — с тахикардией ($r = 0{,}864$; $p < 0{,}05$), нарушениями сна ($r = 0{,}251$; $p < 0{,}05$) и головной болью ($r = 0{,}217$; $p < 0{,}05$). Качество жизни было значимо ниже в группах студентов с вредными привычками, достигая минимальных медианных значений при наличии сочетания вредных привычек, особенно по шкалам «Здоровье» и «Духовность и ЗОЖ». Несмотря на осознание вреда, значительная часть студентов не намерена отказываться от вредных привычек. Результаты исследования подчеркивают необходимость разработки профилактических программ, ориентированных на группы риска — прежде всего на юношей и лиц с сочетанным пристрастием.

Ключевые слова: качество жизни, студенты, курение, энергетические напитки, вредные привычки, образ жизни

Вклад авторов: все авторы внесли равный вклад в подготовку публикации.

Соблюдение этических стандартов: исследование соответствовало принципам биомедицинской этики. Анкетирование было анонимным, что обеспечивало конфиденциальность предоставленной информации. Каждый участник дал информированное согласие на участие до начала опроса.

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Student health issues are becoming increasingly relevant [1, 2]. There are many risk factors that affect the quality of life of this population group: health status and access to medical care, financial situation, level of education and career prospects, social environment, cultural and spiritual values, psychological well-being, etc. [3–5].

Today, studying at a higher education institution involves high cognitive loads, chronic psycho-emotional stress, and a lack of free time, placing intense demands on students [6–8]. The need to multitask, process vast amounts of information, and constantly adapt to social environments often drives young people toward harmful stress-relief methods. Some of the most common of those methods are smoking and drinking energy drinks. The combination of these two harmful habits poses a special hazard for students, creating a medical and social problem that demands a comprehensive solution.

Smoking is one of the most common harmful habits among students. This problem is not confined to Russia, it is international [9, 10]. According to statistical studies, almost every fourth medical student resorts to smoking [11]. Electronic cigarettes, vapes, and hookahs are becoming increasingly popular among the youth. The health risks associated with them have become a concern for medical professionals and the public. Many young people believe that alternative methods of nicotine consumption have fewer negative consequences than smoking traditional cigarettes and are more fashionable and socially acceptable. However, studies show that e-cigarettes can be even more harmful to the body than traditional tobacco products. At the same time, the awareness about the potential negative consequences of such forms of nicotine consumption remains quite low [12, 13].

It should be noted that smoking significantly increases the risk of serious respiratory diseases, including chronic obstructive pulmonary disease and emphysema. In addition, it is the main cause of lung cancer, which remains one of the leading causes of cancer-related deaths. Smokers are more likely to develop cardiovascular pathologies due to narrowing and damage to blood vessels, including coronary heart disease, myocardial infarction, and stroke. There is another risk factor linked to both regular cigarettes and e-cigarettes that is relevant for students: lower intellectual and cognitive abilities [14, 15].

Currently, with the ever-accelerating rhythm of life, people are increasingly sacrificing proper rest, and thus feel the need for special aids that can quickly increase mental and physical performance [16]. Energy drinks are very popular among students during the academic year, especially before tests and exams. Students often get less sleep than they need and feel fatigued after busy days, so they turn to these drinks [17–19]. The composition of energy drinks includes high levels of caffeine and other stimulants like taurine, guarana, and glucose, which can harm the body's cardiovascular and nervous systems. Their excessive consumption can lead to arterial hypertension, tachycardia, arrhythmia, insomnia, and other sleep disorders [20, 21]. Taken regularly, caffeine can cause drug dependence, and have a psychostimulating effect, manifested by anxiety and irritability. In addition, under certain conditions, some components of energy drinks are capable of triggering allergic reactions and other side effects [21–23].

This study aimed to investigate the effects of smoking and energy drink consumption on the quality of life among students at the Burdenko Voronezh State Medical University, and to assess their awareness of the associated health risks.

METHODS

The study was conducted at Burdenko Voronezh State Medical University. We offered 2nd- and 3rd-year students from the medical, dental, and pediatric faculties a two-block electronic questionnaire. The first block asked how often respondents smoked or consumed tonic drinks, why they started these habits, what health consequences they experienced, and their level of awareness about the dangers of such habits. The second block contained O.I. Gubina's Quality of Life Assessment questionnaire (O.I. Gubina, 2007).

We analyzed the collected data using the methods of descriptive statistics and correlation analysis using StatTech 4.2.7 (Stattech; Russia). The Mann–Whitney test was used to compare the ranks between independent groups. The assessment of the strength and direction of the relationship between the studied indicators was performed using the Spearman correlation coefficient (r). Differences and correlations were considered significant at $p \leq 0.05$.

RESULTS

The analysis of the data collected by anonymously surveying medical university students revealed the following trends. The prevalence of smoking among the respondents is 26.5% (Table 1), and 70.1% of them smoke on a daily basis. The average smoking experience is 1–3 years for 52.1% of students, and more than 3 years for 30.8%. As for patterns of tobacco and nicotine consumption, the most popular devices are electronic cigarettes (66.7 per 100 smokers), followed by vapes (30.8 per 100), hookah (26.5 per 100), IQOS tobacco heating systems (17.9 per 100), and regular cigarettes (15.4 per 100). The vast majority of students who smoke (98.3%) admit that there are people in their immediate environment who also smoke. Students cited the influence of friends (35.9%), problems in academic activities or family (34.2%), and other personal circumstances as the main reasons for starting smoking.

Smoking prevalence varied significantly by gender: 40.0% for males and 20.8% for females ($p < 0.001$). Males also dominated in practicing various patterns of tobacco and nicotine consumption (e.g., e-cigarettes, vaping, hookah, IQOS tobacco heating systems; $p < 0.001$). They had longer smoking experience ($p < 0.001$), significantly higher nicotine dependence as measured by craving strength ($p < 0.001$), and were less likely to think about quitting and to report unsuccessful prior quit attempts (both $p < 0.001$). Almost a fifth (19.7%) of smoking students exhibited a low level of motivation to quit. The prevalence of harmful habits did not vary significantly by faculty.

A subjective assessment of the health status of smoking students revealed a number of characteristic complaints. Every fourth respondent reported a cough, while 20.5% reported sputum. Other common symptoms included shortness of breath with minimal exertion (23.9%), tooth deterioration (12.0%), and headaches with dizziness (10.3%). The correlation analysis showed a significant positive correlation between smoking frequency and duration and these subjective symptoms. The correlation was closest for respiratory symptoms, in particular, cough ($r = 0.489$). The associations were also significant for sputum formation, headache, dizziness, and tooth deterioration ($p < 0.05$). The statistical analysis has also revealed gender to be a significant factor affecting the nature of the complaints. More than half of male smokers had a cough, whereas none was reported among female smokers. Moreover, male students were significantly more likely to experience sputum production, bad breath, and tooth decay (Table 2).

Table 1. Prevalence of harmful habits among students, by gender and faculty, *n* (%)

Indicator	All students	Males	Females	*p*
Denying smoking and consuming energy drinks	177 (40.1)	38 (29.2)	139 (44.6)	$p < 0.001$
Smokers	117 (26.5)	52 (40.0)	65 (20.8)	$p < 0.001$
Consumers of energy drinks	233 (52.7)	83 (63.8)	150 (48.1)	$p < 0.005$
Combined consumption	85 (19.2)	43 (33.1)	42 (13.5)	$p < 0.001$

Table 2. Prevalence of smoking-related symptoms among students, %

Symptom	Males (n = 52)	Females (n = 65)	p
Deterioration of health	9.6	6.2	$p > 0.05$
Nausea	7.7	1.5	$p > 0.05$
Shortness of breath with minimal exertion	26.9	21.5	$p < 0.05$
Cough	59.6	0	$p < 0.05$
Sputum production	32.7	10.8	$p < 0.001$
Headache and dizziness	13.5	7.7	$p > 0.05$
Digestive disorders	7.7	3.1	$p > 0.05$
High blood pressure	9.6	0	$p < 0.05$
Bad breath	13.5	3.1	$p < 0.01$
Tooth decay	15.4	9.2	$p < 0.05$
Chest pain	7.7	3.1	$p > 0.05$

The respondents' attitude towards smoking was ambiguous: the vast majority of them (91.5%) recognized this habit as dangerous to their health, but 18.8% of the participating students said they would start smoking again, and 23.9% found it difficult to answer the question about their attitude to smoking.

Energy drink consumption was more common than smoking (Table 3): 52.7% of the respondents admitted drinking them, and the proportion of males among them (63.8%) was significantly larger than that of females ($p < 0.005$). Almost half of the respondents (46.8%) started using tonic drinks at the age of 15–18, mainly seeking to improve performance (75.5%). A significant correlation between consumers' exposure to tonic drinks in their social circles and their own usage ($r = 0.399$) underscores the role of social influence. The vast majority of respondents (61.8%) consume energy drinks less than once a month, 4.3% — daily. The common dose for 91.8% of the participants is one drink at a time. Energy drinks are most often consumed to maintain working capacity (77.7%) and relieve fatigue (44.2%); 28.7% of students noted that their effect lasts for more than three hours.

Correlation analysis revealed a positive link between energy drink consumption and heart palpitations ($r = 0.864$ at $p < 0.05$), as well as associations with sleep disorders ($r = 0.251$ at $p < 0.05$), headache ($r = 0.217$ at $p < 0.05$), nervousness ($r = 0.227$ at $p < 0.05$) and elevated blood pressure ($r = 0.178$ at $p < 0.05$). Young men were more likely to have trouble sleeping (11.5% and 4.5%, respectively; $p < 0.01$) and experience muscle cramps (4.6% and 0.6%, respectively; $p < 0.01$). Over a half of respondents (63.5%) who have this harmful habit are aware of the associated health risks, but 52.4% of them admitted unwillingness to quit it in the near future. When asked if they would start drinking energy drinks again with full knowledge of their negative health effects, 52.4% said yes, while 25.8% were unsure.

Almost a fifth (19.2%) of the sample combined smoking and energy drink consumption; 72.6% of them were primarily identified as smokers, 36.5% — as energy drink consumers. There is a number of specific features that distinguish this group from all students, as well as from those with only one of the studied harmful habits.

Compared to students who only smoke, people with a combined addiction started using tobacco at an earlier age, and they smoke more frequently. The respondents from this group were significantly more often mentioning social circles and "other" factors as the cause of their harmful habit ($p < 0.05$). For them, nicotine dependence was more pronounced, as confirmed by more intense craving for smoking and the greater number of unsuccessful attempts to quit ($p < 0.05$).

Compared to those who only consume energy drinks, this group differs significantly: they formed the habit at an earlier age, consume more frequently, take larger single doses, and have nearly three times the daily intake ($p < 0.05$). Another important finding: the members of the combined use group were significantly more likely to complaint about symptoms associated with energy drinks, including sleep disorders, increased nervousness, tachycardia, and elevated blood pressure ($p < 0.05$). Paradoxically, despite their pronounced negative symptoms, this group of respondents demonstrates a lower assessment of the potential harm of such drinks and remains eager to resume their use.

Students who combine smoking with drinking energy drinks subjectively rated their physical well-being worse than other groups within the sample. They were significantly more likely to express dissatisfaction with their level of performance and give a lower assessment of their own health and physical fitness ($p < 0.05$). This behavioral pattern is probably rooted in the family environment: the immediate relatives of students with a combined addiction are less inclined to lead a healthy lifestyle and have a more tolerant attitude towards alcohol consumption ($p < 0.05$).

A comparative analysis of students' quality of life by behavioral patterns (Table 4) revealed significant differences across several scales. The median quality of life score in the entire sample was 5.2. This indicator was lower among smokers (5.1), and reached

Table 3. Energy drink consumption rates among students, n (%)

Indicator	All students (n = 442)	Males (n = 130)	Females (n = 312)	p
Consume energy drinks	233 (52.7)	83 (63.8)	150 (48.1)	$p < 0.005$
Have consumers in their social circles	383 (86.7)	118 (90.8)	265 (84.9)	$p > 0.05$
Planning to quit	122 (27.6)	54 (41.5)	68 (21.8)	$p < 0.001$
Have quit before	176 (39.8)	59 (45.4)	101 (32.4)	$p < 0.005$
Consider dangerous	302 (68.3)	76 (58.5)	226 (72.4)	$p < 0.005$
Would start consuming again	115 (26.0)	29 (22.3)	86 (27.6)	$p < 0.001$

Table 4. Quality of life indicators, for students with various harmful habits, Me [Q_1; Q_3]

Quality-of-life indicator	All students (n = 442)	Denying smoking and consuming energy drinks (n = 177)	Energy drinks consumers (n = 233)	Combined consumption (n = 85)	p
General standard of living	5.6 [5.0; 6.4]	6.0 [5.0; 6.6]	5.4 [4.8; 6.2]	5.4 [4.8; 6.0]	$p^{1.2} > 0.05$ $p^{1.3} < 0.01$ $p^{2.3} > 0.05$
Professional relations	5.8 [5.2; 6.6]	6.0 [5.4; 6.8]	5.6 [5.0; 6.4]	5.6 [4.8; 6.4]	$p^{1.2} > 0.05$ $p^{1.3} < 0.001$ $p^{2.3} > 0.05$
Health	4.6 [3.8; 5.2]	5.0 [4.0; 5.4]	4.2 [3.6; 5.0]	4.0 [3.6; 4.8]	$p^{1.2} > 0.05$ $p^{1.3} < 0.001$ $p^{2.3} < 0.005$
Family	5.2 [4.6; 5.8]	5.0 [4.6; 5.8]	5.0 [4.6; 5.8]	5.0 [4.4; 5.6]	$p^{1.2} > 0.05$ $p^{1.3} < 0.005$ $p^{2.3} < 0.05$
Spirituality and healthy lifestyle	4.8 [4.2; 5.4]	5.0 [4.4; 5.6]	4.6 [4.0; 5.2]	4.6 [4.0; 5.0]	$p^{1.2} > 0.05$ $p^{1.3} < 0.005$ $p^{2.3} > 0.05$
Average QOL score	5.2 [4.7; 5.7]	5.0 [4.8; 5.8]	5.0 [4.4; 5.5]	5.0 [4.4; 5.5]	$p^{1.2} > 0.05$ $p^{1.3} < 0.001$ $p^{2.3} < 0.005$

Note: $p^{1,2}$ — significance of differences between those who deny harmful habits and those who consume energy drinks; $p^{1,3}$ — significance of differences between those who consume energy drinks and students with combined consumption; $p^{2,3}$ — significance of differences between those who deny harmful habits and students with combined consumption.

minimum values (5.0) among those combining smoking and energy drink consumption.

Behavioral factors had the most pronounced effect on physical well-being. For the entire sample, the median Health scale score was 4.6; it decreased consistently across the groups with harmful habits: 4.4 for smokers, 4.2 among energy drink consumers, and 4.0 (minimum) for those with a combined habit. Moreover, the combined addiction group had a significantly different score compared to both smokers and energy drink consumers ($p < 0.005$).

A similar downward trend, although not statistically significant, was observed for the Spirituality and Healthy Lifestyle scale: the median score decreased from 4.8 in the general sample to 4.6 in the group with a combination of habits.

Satisfaction rates with professional and family relationships were generally lower among students with behavioral risks; the combination of two habits yielded the minimal median values (5.6 and 5.0, respectively) However, there were no significant differences in the assessment of professional relations between the groups.

The comparison of students who denied having harmful habits with the combined addiction group revealed significant differences across all sections of the quality of life questionnaire.

There is a weak positive correlation between smoking and drinking energy drinks (r = 0.240 at $p < 0.05$), which suggests a general pattern of behavior associated with the use of psychoactive substances.

The combined effect of these harmful habits on well-being manifests in correlations: smoking is associated with a complex of symptoms, including poorer physical condition (r = 0.240 at $p < 0.05$) and higher blood pressure (r = 0.178 at $p < 0.05$). Consumption of energy drinks, in turn, is significantly related to symptoms such as headache (r = 0.217 at $p < 0.05$) and sleep disturbance (r = 0.251 at $p < 0.05$).

An important result of the study was the discovery of a feedback link between the studied habits and the quality of life. Thus, smoking is negatively associated with a lower mean quality of life score (r = –0.138 at $p < 0.05$), same as consumption of energy drinks (r = –0.128 at $p < 0.05$).

DISCUSSION

In our study, the smoking prevalence rate (26.5%) falls within the same range as previously reported for this university (37.2%). Both studies record the dominance of e-cigarettes among all forms of nicotine consumption: according to our survey, 66.7% of smoking students prefer them, which is close to the previously noted 75% [11]. This trend reflects a shift in the preferences of young people towards alternative products, which are often mistakenly perceived as less harmful. The contradiction lies in the fact that the majority of smoking respondents (91.5%) admit the harm of the habit, but continue to smoke. This underscores insufficiency of the awareness increase efforts in this area, and necessitates the development of a comprehensive program that combines psychological support, improvement of stress management skills, and sustainable motivation to quit smoking.

The higher involvement of young men, their greater smoking experience and addiction to vapes, hookahs and IQOS systems may stem from differences in their approach to stress relief and the influence of same-sex peers. This harmful habit is traditionally common among males, as opposed to females [24]. Thus, preventive measures primarily designed for this population should factor these facts in.

Energy drinks consumption turned out to be an even more popular habit, practiced by 52.7% of the respondents, with males dominating in this cohort (63.8%). The primary reasons mirror those reported in 2022 at this university: warding off fatigue and boosting performance amid heavy academic demands. The most alarming is the confirmation of the negative effects of energy drinks. We identified a correlation between the consumption of such drinks and palpitations (r = 0.864 at $p < 0.05$), sleep disorders, headache, and nervousness. This data is consistent with the results of a 2022 study, in which more than half of consumers reported elevated blood pressure, arrhythmia, tremor, and excitability. It is possible that quality of life deteriorates because stimulants desynchronize the body's internal rhythms, cause vegetative imbalance, and increase anxiety, thereby heightening the already chronic stress of learning [22].

Special attention should be paid to the group that combines smoking and consumption of energy drinks. There is a positive correlation between these habits ($r = 0.240$ at $p < 0.05$); it supports a unified reason, the wish to use stimulants to quickly change the psychophysiological state. In combination, nicotine and caffeine exacerbate one another's cardiotoxicity and neurotoxicity. The harmful effects of this combination on the physical condition are further evidenced by the most pronounced differences in Health scale scores ($p < 0.005$).

CONCLUSIONS

The prevalence of harmful habits among medical university students remains high. Over a half of the surveyed students (52.7%) consume energy drinks, and more than a quarter smoke, which is undoubtedly a significant medical and social problem. The proportion of males who combine harmful habits is significantly greater than that among females. Virtually every fifth respondent belongs to the combined addiction group, which is concerning finding. This group scored the lowest on all quality of life assessment scales, especially in the Health and Spiritual Well-being sections. While realizing the harm, a significant part of the respondents do not intend to give up the habits, which indicates insufficiency of the awareness increase efforts. Thus, targeted preventive measures are needed, including promoting alternatives to energy drinks, encouraging smoking cessation, and working with at-risk groups, primarily young men and those with multiple harmful habits. The implementation of such programs can contribute to improving the health and living standards of students.

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