



Energy drink consumption among students: Medical, biological and behavioural analysis

Andrii Ivanchuk*

Lecturer

Lviv Vocational College of Hotel, Tourism and Restaurant Service

79060, 36 Ivan Pulyuya Str., Lviv, Ukraine

<https://orcid.org/0009-0006-6433-3973>

Abstract. Energy drink consumption among students is a widespread phenomenon that requires scientific analysis given the potential health risks. The aim of the current study was to determine the prevalence, motives, frequency and intensity of energy drink consumption among students of different courses, as well as to assess their attitudes towards the potential health effects. The study was conducted using an online survey of 166 first-, second- and third-year students, using descriptive statistics and comparative analysis. It was found that more than half of the students surveyed consume energy drinks regularly or occasionally, with the frequency of consumption increasing significantly with each year of study. It was found that senior students are more likely to consume energy drinks several times a week or daily, which indicates the formation of stable behavioural patterns of stimulant consumption. The most common motives for consumption are overcoming fatigue, compensating for sleep deprivation, increasing mental performance and taste preferences. It was found that a significant proportion of respondents do not read or only occasionally pay attention to the composition of energy drinks, and also have fragmentary knowledge about the safe daily intake of caffeine. Regular consumers more often report sleep disturbances, increased irritability, episodes of palpitations, and decreased concentration, which indicates functional overload of the nervous and cardiovascular systems. The results indicated an insufficient level of awareness of the medical and biological risks associated with energy drink consumption and a potential tendency among students to develop stimulant behaviour. The practical significance of the study lies in the possibility of using the results to develop preventive and educational programmes aimed at raising students' awareness of the safe consumption of energy drinks and the formation of health-saving behaviour in educational institutions

Keywords: consumption of stimulant drinks; youth dietary behaviour; health risks; motivational factors; behavioural characteristics; student youth; awareness assessment

Introduction

The consumption of energy drinks among adolescents and young people shows a steady upward trend, which makes it relevant to study this issue from a medical and biological point of view. The active spread of such drinks among students is associated with an intense academic workload, chronic sleep deprivation, the influence of stress factors, and easy access to stimulants. Energy drinks are widely marketed as a means of quickly increasing performance and concentration, but their regular consumption can be accompanied by adverse functional changes in the cardiovascular, nervous and endocrine systems, which is particularly significant at a young age. In this regard, studying

the characteristics of energy drink consumption among students, as well as analysing the associated behavioural and medical-biological risks, is an important scientific and practical issue.

In a study by S. Visram *et al.* [1], the characteristics of energy drink consumption among students in European Union countries were analysed, and a link was established between regular consumption and sleep disturbances, daytime fatigue and a decline in overall well-being. The authors emphasised that young people often underestimate the cumulative effect of caffeine, especially when consuming several stimulants throughout the day. A systematic review

Suggest Citation:

Ivanchuk I. Energy drink consumption among students: Medical, biological and behavioural analysis. Ukr J Med Biol Sport. 2025;10(4):15–22. DOI: 10.63341/uajmbs/4.2025.15

*Corresponding author



conducted by M.A. Heckman *et al.* [2] showed that regular consumption of energy drinks is associated with increased heart rate, blood pressure fluctuations, and functional changes in the cardiovascular system in young adults. The authors emphasised the need for further research combining physiological indicators with an analysis of behavioural factors.

The work of S.G. Çalışkan [3] examines the neurophysiological mechanisms of caffeine's effects on adolescents and young adults, in particular its impact on the excitability of the central nervous system, attention and emotional regulation. The researchers noted that excessive and regular consumption of stimulants can contribute to the formation of addictive behaviour and disruption of circadian rhythms. S. Richards & A.P. Smith [4] demonstrated that the combination of caffeine and taurine in energy drinks can have a synergistic effect, enhancing the cardiotonic effect and affecting heart rate variability. The authors drew attention to the limited amount of data on the long-term effects of this combination on the body of young people.

A prospective study by N.M. Makki *et al.* [5] found that students who regularly consume energy drinks are more likely to report increased anxiety, emotional instability, and decreased concentration. The authors emphasised the role of motivational factors in the formation of stimulant consumption patterns. A study by J. Menzel *et al.* [6] revealed a low level of awareness among students regarding safe daily doses of caffeine, as well as insufficient attention to the labelling of energy drinks. Similar results were obtained in the work of D. Nowak & A. Jasionowski [7], dedicated to the countries of Central and Eastern Europe, which highlights the lack of comprehensive studies combining medical-biological and behavioural approaches.

Despite the existence of a significant number of studies devoted to the analysis of energy drink consumption among young people, most of them focus on the overall prevalence, possible risks or physiological consequences of consumption. In Ukraine, such studies are mostly fragmentary, covering individual regions or age groups, without taking into account the behavioural, motivational and informational aspects of consumption. It is particularly important that previous studies have hardly considered regional characteristics of energy drink consumption among students of higher education institutions, in particular at the level of individual colleges; comparative analysis between students of different courses, which allows assessing the dynamics of food behaviour formation in the learning process; the relationship between the level of awareness of risks and actual consumption practices; the combination of motivational, behavioural and physiological factors within a single comprehensive study; the impact of academic workload and stress factors on the frequency of energy drink consumption among vocational education students.

Thus, there is a lack of comprehensive empirical data describing the actual patterns of energy drink consumption among Ukrainian students in the context of their daily educational and social activities. This creates a need for research combining quantitative indicators, behavioural

analysis and assessment of young people's awareness of potential risks. The aim of the study was to analyse the prevalence, motivational factors, frequency and characteristics of energy drink consumption among 1st-3rd year students at the Lviv College of Hotel, Tourism and Restaurant Services.

Materials and Methods

The study was conducted during the 2024/2025 academic year at the Lviv Professional College of Hotel, Tourism and Restaurant Services. The work was empirical in nature and involved an anonymous online survey of students using a standardised questionnaire created in Google Forms. A total of 166 first- to third-year students aged 15 to 18 participated in the study. The sample was formed on the basis of accessibility and voluntariness, without coercion. All students who agreed to complete the questionnaire and confirmed that they were familiar with the purpose of the study were included in the study. No exclusion criteria were applied, which ensured the representativeness of the data for this educational institution.

The methodological approach was designed so that the results obtained could be easily reproduced by other researchers under similar conditions. The questionnaire consisted of several sections:

- 1) socio-demographic data (year of study, age, gender);
- 2) prevalence and frequency of energy drink consumption;
- 3) motives for consumption;
- 4) level of awareness of possible risks;
- 5) self-assessment of the impact of energy drinks on well-being;
- 6) attitude towards potential harm and risky behaviour.

Most of the questions in the questionnaire were closed-ended with fixed answer options, while some were semi-open-ended to clarify the respondents' positions; the research tool was an author's questionnaire developed with the research objectives and tasks in mind.

Information was collected remotely by distributing a link to the questionnaire among student groups. All responses were automatically recorded in a Google Sheets table. The results were processed using descriptive statistics; the statistical significance of differences between groups was assessed at a significance level of $p < 0.05$. For greater accuracy, rounding was applied in accordance with statistical norms. The results were presented graphically in the form of bar charts and histograms, which allowed for a clear visualisation of trends and differences between courses.

The study complied with ethical standards accepted in the field of public health and educational research. Participation was voluntary, and students could refuse to complete the questionnaire at any time. Explanations of the purpose and content of the study were provided before the survey began. The survey was conducted anonymously, and no personal data of participants was collected, ensuring confidentiality and protection of private information. The study did not involve any physical or psychological intervention and did not pose a risk to participants. The study was conducted in accordance with the requirements

of the European Commission [8]. The methods and tools described make it possible to completely replicate the study in other educational institutions using a similar approach to sample formation and information collection.

Results and Discussion

The study provided a number of indicators reflecting the characteristics of energy drink consumption among students and allowing for an assessment of potential medical and biological risks to health. An analysis of the prevalence of energy drink consumption among students of different courses is presented in Figure 1. As can be seen, the majority (56.6%) of respondents consume energy drinks at least occasionally, which indicates a significant prevalence of stimulant food patterns among students. The proportion of consumers increases with the length of study and is 50% among first-year students, 55% among second-year students, and 66% among third-year students. This trend may indicate the gradual formation of a stable behavioural pattern of stimulant use in the learning process.

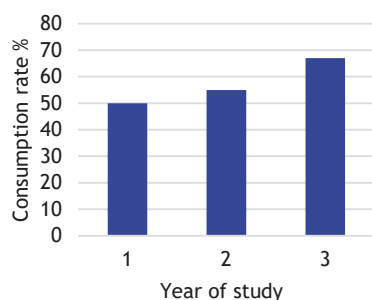


Figure 1. Prevalence of energy drink consumption

Source: compiled by the author

Thus, the results obtained indicate a clear trend towards an increase in the frequency of energy drink consumption with an increase in the course of study, which may be associated with the accumulation of academic and psycho-emotional stress, sleep disturbances and increased stress levels. At the same time, about 43.9% of the students surveyed said they do not consume energy drinks, which can be seen as a manifestation of a responsible attitude towards preserving their own health. From a medical and biological point of view, the increase in the frequency of energy drink consumption in senior years is a cause for concern, as regular intake of caffeine and other stimulants can lead to functional overload of the nervous and cardiovascular systems. As noted by A.R. Jagim *et al.* [9], systematic consumption of energy drinks is associated with sleep disturbances, increased heart rate, fluctuations in blood pressure, and increased irritability, which is especially dangerous at a young age. The results obtained in the current study indicate the need to strengthen preventive measures aimed at developing healthy eating habits and a responsible attitude towards the use of stimulants among students.

At the same time, the occasional consumption of energy drinks, even among individuals who do not consume

them regularly, indicates a potential risk of developing stimulant behaviour and highlights the need for preventive measures aimed at informing students about possible functional disorders of the nervous and cardiovascular systems. An analysis of frequency of use (Fig. 2) showed that most consumers (62%) consume energy drinks no more than twice a month. Another 28% reported consuming them once or twice a week, which can already be considered regular use of stimulants. Only 10% of students said they consume energy drinks several times a week or more often. The distribution by year showed that third-year students were more likely to consume energy drinks regularly, while first-year students were more likely to consume them irregularly. The median frequency was twice a month, which is consistent with data from European and American studies.

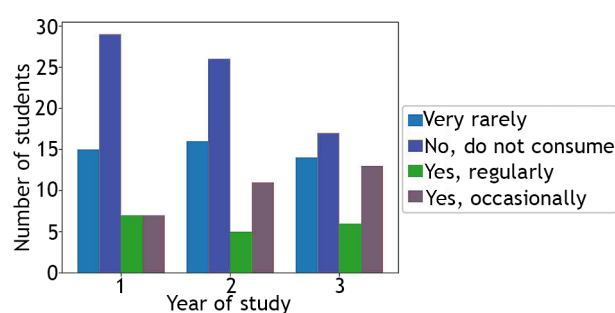


Figure 2. Frequency and intensity of consumption

Source: compiled by the author based on the results of a student survey

Special attention was paid to the volume of single consumption: 74% of students consume one can of energy drink (250-500 mL) at a time, 19% consume two cans, and 7% said they sometimes consume three or more cans, which exceeds the recommended daily intake of caffeine and can cause acute reactions in the body. From a medical point of view, a single intake of high doses of caffeine is associated with the activation of the sympathoadrenal system, manifested by tachycardia, increased blood pressure, tremors and psychoemotional arousal. Such doses are particularly dangerous for young people, whose neurovegetative regulation mechanisms are still developing, which increases the risk of functional disorders of the cardiovascular and nervous systems. Regularly exceeding the daily dose of caffeine can also contribute to sleep disturbances, tolerance development, and dependent stimulant behaviour.

A study of the motives for consumption (Fig. 3) identified three main categories of reasons. The first and most common is taste preferences, which were mentioned by 49% of respondents. This indicates that energy drinks are viewed by students not only as a means of increasing energy levels, but also as a product with attractive taste characteristics. The second important group of motives is compensation for fatigue and sleep deprivation, which was noted by 23% of respondents. This confirms the existence of a problem of chronic exhaustion among students, who often try to quickly restore their productivity. The third

category is improving concentration and increasing performance, which was indicated by 8% of respondents.

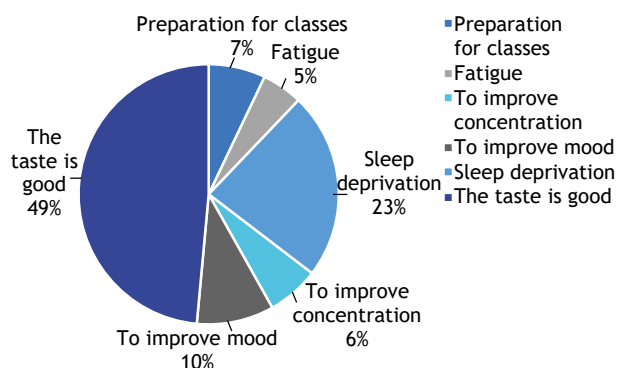


Figure 3. Motives and conditions of use

Source: compiled by the author based on the results of a student survey

This behaviour is typical for students during exam periods, when completing coursework or long-term practical assignments. An additional 10% of students said they consume energy drinks “to improve mood” or under the influence of friends, indicating social and behavioural factors

in consumption. From a medical and psychophysiological point of view, the use of stimulants in stressful conditions can lead to a short-term increase in performance followed by exhaustion of the nervous system. Regular combination of psycho-emotional stress with the consumption of caffeinated beverages is associated with increased anxiety, irritability, sleep disturbances, and a decrease in the ability to restore cognitive functions. The influence of the social environment further increases the risk of uncontrolled consumption of energy drinks, which can contribute to the formation of dependent stimulant behaviour at a young age, as emphasised by S. Kaldenbach *et al.* [10] and C. Protano *et al.* [11].

An analysis of the popularity of energy drink brands among students showed that only 15% of all respondents do not pay attention to the brand when purchasing a product. Most young people who consume energy drinks consciously prefer one or more brands. When answering the question, respondents were allowed to choose several options, as students could consume products from different manufacturers. In this regard, the figures reflect the frequency of brand mentions, not the share of unique consumers, and are calculated from the total number of students surveyed ($n = 166$) (Fig. 4).

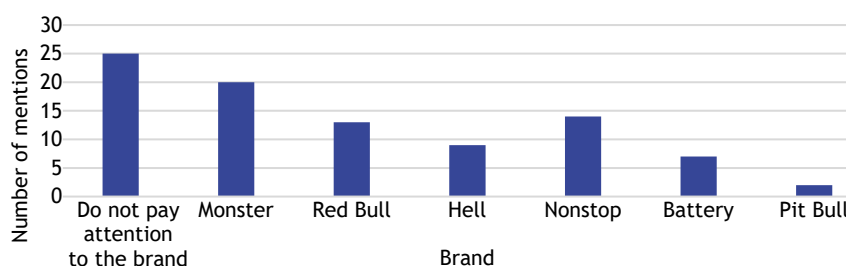


Figure 4. Popularity of energy drink brands

Source: compiled by the author based on the results of a student survey

The study showed that Ukrainian youth most often choose “Monster”, “Nonstop”, and “Red Bull” brands among energy drinks. Students noted their taste, “effectiveness,” and bright marketing focus. Summarising the data obtained, it can be noted that the popularity of certain brands among students has medical and biological significance, as different brands vary significantly in their composition, particularly in terms of caffeine concentration and the presence of taurine, guarana, sugar and other biologically active substances, which is essential for assessing potential health risks. Regular consumption of beverages with a high concentration of caffeine potentially increases the risk of functional disorders of the cardiovascular and nervous systems, especially under conditions of stress and disturbed sleep patterns. Identifying the most popular brands among students allows to identify products with increased stimulant load and take this into account when developing preventive and educational measures aimed at preserving health.

Assessing students’ attitudes towards the impact of energy drinks on health was also an important aspect of the analysis, as the level of awareness of potential risks directly influences the dietary and stimulant behaviour of young people. The results of the survey on students’ attitudes towards the impact of energy drinks on the body are shown in Figure 5. The data obtained indicate a contradictory attitude of students towards potential risks. In general, 55% of respondents consider energy drinks harmful to the body, but a significant proportion (34.3%) consider the impact to be neutral, which may indicate insufficient awareness of the risks. The level of student awareness regarding the composition of energy drinks and knowledge of the daily caffeine intake limit are important factors in shaping responsible eating habits. The survey found that a significant proportion of respondents do not pay attention to product labelling or do so only occasionally, which may contribute to uncontrolled consumption of stimulants. The data obtained indicate the need to strengthen information and educational work in the student environment (Table 1).

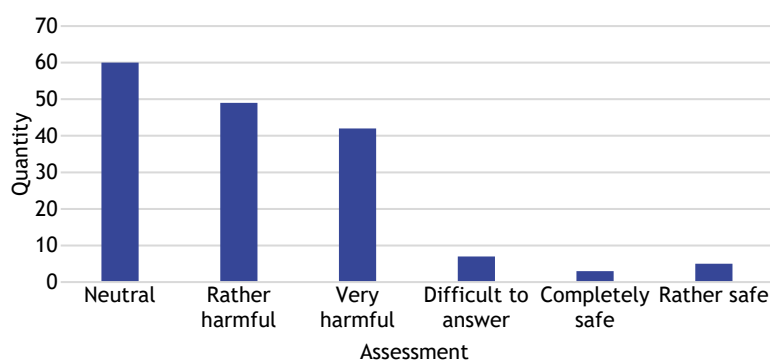


Figure 5. Students' attitudes towards the effects of energy drinks on the body

Source: compiled by the author based on the results of a student survey

Table 1. Students' awareness of the composition and norms of caffeine

Indicator	Response category	Share, %
Reading the composition of energy drinks	Do not read	56.0
	Occasionally	32.5
	Read carefully	11.4
Knowledge of the daily caffeine intake limit	"Know something"	44.0
	"Know"	40.4
	"Do not know"	15.7

Source: compiled by the author based on the results of a student survey

A comparative analysis of the survey results revealed statistically significant differences in the consumption patterns of energy drinks among students of different years ($p < 0.05$). In particular, third-year students significantly more often reported consuming energy drinks during periods of increased academic workload, which may indicate the formation of persistent stimulant behaviour as a way to overcome fatigue and sleep deprivation. In contrast, first-year students predominantly consume energy drinks on a trial or episodic basis, which is likely related to the stage of adaptation to new learning conditions and less pronounced academic and psycho-emotional stress.

Second-year students occupy an intermediate position, demonstrating a transitional type of behaviour – from irregular to more frequent consumption of energy drinks, which may reflect the gradual consolidation of stimulant dietary habits. From a medical and biological point of view, this dynamic is unfavourable, as regular consumption of caffeinated beverages at a young age is associated with an increased risk of cardiovascular and nervous system disorders, chronic fatigue, anxiety disorders and sleep disorders. The differences identified between courses emphasise the need for differentiated preventive measures aimed at forming health-saving behaviour, especially among senior students who are at increased risk of regular consumption of energy drinks.

The data obtained in the study are consistent with current international trends and confirm the widespread consumption of energy drinks among students. Comparing the results with scientific publications from other countries allows for a deeper interpretation of students' behavioural characteristics and an assessment of the risks associated

with the growing popularity of energy drinks. First of all, the proportion of consumers (56.6%) in the Lviv college is almost identical to the figures obtained in studies in Poland [12], Croatia [13] and Hungary [14], where 52% to 64% of young people consume energy drinks at least once a month. Similar results were obtained at universities in Canada, where the level of consumption among students ranges from 53% to 70% depending on the year of study and specialisation, as evidenced by data from J.L. Reid *et al.* [15]. Thus, the trend observed among Ukrainian students corresponds to global indicators and indicates the global nature of the problem.

It is important to note the gradual increase in the frequency and intensity of energy drink consumption with the transition to higher years of study. According to G. Aonso-Diego *et al.* [16], first-year students were more likely to try energy drinks for the first time, while older students were more likely to consume them regularly. Such trends are associated with the formation of stable behavioural patterns in young adults. A study by J. Higgins *et al.* [17] indicated that older students are more likely to use energy drinks as a means of coping with increased academic workload, sleep deprivation and chronic fatigue, which is consistent with the results obtained in the current study. The authors indicate that regular consumption increases during exam periods, which is identical to the results obtained in the current study, where third-year students demonstrated the highest level of consumption.

The structure of motives is no less important. In the current study, the most common reasons were taste preferences, combating fatigue and the desire to increase work capacity. International sources, in particular the analysis

by H. Sampasa-Kanyinga & H.A. Hamilton [18], confirm a similar triad of motives: taste dominates in most studies (60-70% of respondents), while increased energy and concentration are noted by an average of 40-55% of students. This aspect has hardly been studied in Ukraine, which makes the results obtained important for forming further conclusions and recommendations.

One of the most concerning findings is the low level of awareness among students about the composition of energy drinks and their potential harm. Only one in four respondents who consume such drinks said they read the product labels. A similar level is observed among students in Spain and France, where the proportion of informed consumers does not exceed 30%, as reported in the work of B. Wassef *et al.* [19]. Insufficient attention to the amount of caffeine and other stimulants leads to the risk of overdose, a problem that is actively discussed in the scientific literature.

In terms of brand popularity, the results are consistent with international trends in energy drink consumption. In particular, according to a study by E.S. Oberhoffer *et al.* [20], the “Monster” and “Red Bull” brands occupy leading positions in the energy drink market in the European Union and the United States, which correlates with the high recognition of these products among young people. The work of D. Wiggers *et al.* [21] shows that aggressive marketing strategies, modern packaging design and an active presence in digital media significantly influence the formation of consumer preferences among adolescent and student youth. Similar conclusions were drawn by S. Kaur *et al.* [22], who noted that branding and advertising messages can reduce critical perception of the potential medical and biological risks associated with energy drink consumption.

Another aspect that requires attention is the relationship between energy drink consumption and sleep quality. The data from the presented study are consistent with the observations of I. Lasheras *et al.* [23], who confirmed that students who regularly consume energy drinks are more likely to report sleep disturbances, anxiety, and reduced concentration during the day. This indicates the possibility of a “vicious circle”: sleep deprivation → fatigue → consumption of energy drinks → poorer sleep → even greater fatigue.

The results indicate that student behaviour is determined not only by physiological factors, but also by social and informational factors. A significant proportion of young people do not have sufficient knowledge to critically assess the potential medical and biological risks, as a result of which energy drinks are often perceived as a “safe” product for everyday consumption. The study confirms the advisability of developing targeted educational strategies aimed at raising students’ awareness of the effects of caffeine and other stimulants on the cardiovascular and nervous systems. It is advisable to introduce preventive measures of a medical and educational nature, in particular lectures, information campaigns and the integration of issues of rational consumption of stimulants into health education programmes, which can help reduce the risks of health problems among students. Thus, the results of the

study not only reflect international trends, but also demonstrate a number of features characteristic of the Ukrainian student environment.

Conclusions

The results of the study allowed for a comprehensive assessment of the scale and characteristics of energy drink consumption among students of the Lviv Professional College of Hotel, Tourism and Restaurant Services from the perspective of medical, biological and behavioural analysis. Analysis of the data obtained showed that energy drinks occupy a prominent place in the dietary and stimulant practices of students and are often used as a means of overcoming fatigue, compensating for sleep deprivation, increasing mental performance, or as an element of social interaction. It was found that more than half of the students surveyed (56.6%) consume energy drinks, with the frequency and intensity of their consumption increasing with the length of their course of study. Third-year students demonstrated the highest regularity of consumption (66%), which may indicate an accumulation of academic and psycho-emotional stress, as well as the formation of stable patterns of stimulant behaviour. From a medical and biological point of view, this trend is unfavourable, as regular intake of caffeine and other stimulants is associated with the risk of sleep disorders, increased nervous system excitability, the development of chronic fatigue and functional disorders of the cardiovascular system, in particular tachycardia and fluctuations in blood pressure.

It was found that students are insufficiently informed about the composition of energy drinks and the potential medical and biological consequences of their consumption: most respondents (56%) do not read the labels, about 60% are almost completely unaware of safe daily doses of caffeine and, despite being aware of the possible harm, continue to consume such drinks. This indicated the need to strengthen the prevention of health problems by fostering a responsible attitude towards the use of stimulants at a young age. The results were consistent with international scientific data and confirm the relevance of the problem of uncontrolled consumption of energy drinks among young people. Further research may focus on studying the physiological effects of energy drinks on adolescents and young people, analysing the long-term impact on cognitive functions, behaviour and psycho-emotional state, as well as comparing the indicators of students from different regions of Ukraine.

Acknowledgements

The author expresses gratitude to the college administration and the students for their participation in the research.

Funding

The study was not funded.

Conflict of Interest

None.

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Споживання енергетичних напоїв студентами: медико-біологічний та поведінковий аналіз

Андрій Іванчук

Викладач

Львівський професійний коледж готельно-туристичного та ресторанного сервісу

79060, вул. Івана Пулюя, 36, м. Львів, Україна

<https://orcid.org/0009-0006-6433-3973>

Анотація. Споживання енергетичних напоїв серед студентської молоді є поширеним явищем, що потребує наукового аналізу з огляду на потенційні ризики для здоров'я. Метою поточного дослідження було визначити поширеність, мотиви, частоту та інтенсивність споживання енергетичних напоїв студентами різних курсів, а також оцінити їхнє ставлення до потенційного впливу на здоров'я. Дослідження проведено методом онлайн-анкетування серед 166 студентів першого, другого та третього курсів із використанням методів описової статистики та порівняльного аналізу. Установлено, що понад половина опитаних студентів вживають енергетичні напої регулярно або епізодично, при цьому частота їх споживання достовірно зростає зі збільшенням курсу навчання. Виявлено, що студенти старших курсів частіше вживають енергетичні напої кілька разів на тиждень або щоденно, що свідчить про формування стійких поведінкових моделей стимуляторного споживання. Найбільш поширеними мотивами вживання є подолання втоми, компенсація нестачі сну, підвищення розумової працездатності та смакові вподобання. Установлено, що значна частка респондентів не читає або лише інколи звертає увагу на склад енергетичних напоїв, а також має фрагментарні знання щодо безпечної добової норми кофеїну. Регулярні споживачі частіше повідомляють про порушення сну, підвищену дратівливість, епізоди серцебиття та зниження концентрації уваги, що свідчить про функціональне перенапруження нервової та серцево-судинної систем. Отримані результати вказують на недостатній рівень усвідомлення медико-біологічних ризиків, пов'язаних зі споживанням енергетичних напоїв, та потенційну схильність студентської молоді до формування стимуляторної поведінки. Практичне значення дослідження полягає у можливості використання отриманих результатів для розроблення профілактичних та інформаційно-просвітницьких програм, спрямованих на підвищення обізнаності студентів щодо безпечного споживання енергетичних напоїв і формування здоров'язбережувальної поведінки в закладах освіти

Ключові слова: споживання стимулювальних напоїв; молодіжна харчова поведінка; ризики для здоров'я; мотиваційні чинники; поведінкові особливості; студентська молодь; оцінка обізнаності