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Patterns and Factors Influencing High-Energy Beverage Consumption among University Students

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ABSTRACT

Background: Energy beverages have become popular among youth, especially among university students, and the energy beverage market is a rapidly growing industry; it has many effects on health, so this study aims to assess patterns and factors affecting high-energy beverage consumption among university students. **Methods:** A cross-sectional design was used. An online self-administered questionnaire was used as a data collection tool. **Results:** The data reveal that 55.2% of the studied sample consumed energy beverages and half (98.8% and 80.3%) respectively, female and male students consumed high-energy beverages for 1-2/weeks with a significant statistical difference (< 0.001 and 0.000058) between male and female students regarding the frequency of consumption and a maximum number of cans consumed per day, (60.2% and 47.1%) female and male students respectively consume high-energy beverages for the reason of study and exams which was the main factor for consumption. **Conclusion:** More than half of the studied university students consume energy beverages regularly, and about two-thirds are male. For most, the main factor for consumption was study and exams. Unawareness regarding the ingredients of high-energy beverages and the belief that high-energy beverages have a good effect on health were significantly associated with consumption.

Keywords: Consumption; High Energy Drinks Beverage; University Students

INTRODUCTION

Energy drinks (EDs), commonly referred to as high-energy beverages, are drinks that usually contain a significant amount of caffeine, sugars, additives, and legal stimulants, like guarana, taurine, and L-carnitine. These legal stimulants can lead to increased alertness, attention, and energy, as well as increased blood pressure, heart rate, and breathing. As found, children, adolescents, and young athletes make up around 50% of the consumers. Regrettably, schools are selling these products without any oversight (Thiab *et al.*, 2023).

Consumers utilize energy beverages to increase their energy levels, encourage wakefulness, stay alert, and improve their mood and cognitive functions. While they may seem like a new trend, these beverages have been accessible to the general public for some time. The beverage manufacturers created this term, but it does not have the recognition of the United States Food and Drug Administration (FDA) or the United States Department of Agriculture (USDA). Students commonly use these drinks to enhance their energy levels. However, it's important to note that the stimulants in these drinks have the potential to harm the nervous system (Nowak & Jasionowski, 2015). This potential risk should be a cause for caution.

Adults aged 18 to 55 who use energy drinks report feeling more energized after consuming them; this effect can continue up to 90 minutes. It peaks 30 to 60 minutes after consumption. About four to six cups of coffee are

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equal to one energy drink. Globally, young adults and those under 35 account for over half of the consumer market (El-Shintiri *et al.*, 2022). In several parts of different Gulf countries, there has been a change in the intake of beverages, especially caffeinated ones, that has been reported. According to UAE university students, 85.1 percent have experienced ED, and 97% have consumed caffeinated beverages (Thiab *et al*., 2023). The use of EDs was reported to be high among male students from Saudi Arabia (54%). The rising prevalence and popularity of caffeinated beverages among young people require that information and knowledge about their use and adverse physical effects be disseminated (Khan, 2019).

It is important for nurses to safeguard and promote health as well as prevent disease. They achieve this through providing people and the general public the freedom to make their own decisions about their health, enabling them to take charge of their own actions, and, when practical, assisting them in managing their own treatment. Nurses must be aware of the new health issues and acquired habits that may spread in the community and affect health in the short or long term. High-energy beverages are one of the new habits that have started to spread in the Egyptian community, especially among young adults. The nursing profession plays a crucial role in raising awareness, particularly for vulnerable groups such as young adults in higher education, aiming to dispel misconceptions and prevent health issues associated with excessive daily drink high energy beverage consumption (Sajadi-Ernazarova and Hamilton, 2023).

University students consume various energy beverages for multiple reasons without knowing the potential risks and because of a lack of trustworthy information (Aljaloud, 2016). Different students consume potentially harmful energy beverages to achieve academic success, speed, or strength. It is common for students to believe that energy beverages can improve attention when faced with prolonged cognitive or mental demands (Gira´n, *et al*., 2023). This paper contributes to the literature by determining the proportion of university students who consume energy beverages, assessing their pattern of consumption, and the factors that influence it.

There are many factors affecting university students' consumption of high-energy beverages. A study in Egypt revealed that about one-third of university students are motivated to consume EDs regularly, including staying awake, getting refreshed, gaining more energy, and enhancing sports performance (Ezzat, 2016). A recent study (Edrees *et al*., 2022) showed that ED consumption has reached a high prevalence of 74.8% among Saudi students. This behavior is now considered to pose a health risk. However, there is still little research done on ED consumption patterns among adolescents in Egypt (Ezzat, 2016).

Furthermore, there is insufficient data to report the associated factors of ED consumption. It is imperative to conduct further research to evaluate the consumption pattern, awareness, and perception of EDs and their detrimental effects on adolescent health. This ongoing investigation is crucial for understanding and addressing the issue. The nurse advocates for establishing basic standards on products, for the placement of advisory labels for energy drink ingredients to ensure consumer safety, and for participating in the issuance and dissemination of energy drink warnings to minors, pregnant women, people with allergies, people with heart disease, and athletes due to health concerns (Robby & Sanad 2017).

Aim of Study

The study aims to

Assess patterns of high-energy beverage consumption among university students.

Assess the factors influencing university students' high-energy beverage consumption.

Comparison between male and female students regarding patterns and factors of high-energy beverage consumption among university students.

METHODOLOGY

Research Design

A descriptive cross-sectional design study was adopted to carry out this study.

Study Setting

One of the non-governmental universities in Cairo. Which involved seven colleges offering various degrees in the humanities, arts, engineering, and health. Each college has 500–1,000 students per square mile. Energy drink use habits and their effects on university students' health were assessed among a sample of humanities

colleges the researcher excluded the health-related colleges.

The research adhered to ethical guidelines, ensuring participants' rights were respected. Participants voluntarily completed the online questionnaire, which explained the study's purpose. By fully completing the questionnaire, participants gave their consent to take part. Their identities were kept confidential throughout.

Sample

The following equation was used to determine the sample size.

n = (Z^2 * p * (1-p)) / e^2 (1-p)) / e^2

n: Required sample size

Z: Z-score, which corresponds to the desired confidence level (1.96 for 95% confidence)

p: Estimated proportion of the population with the characteristic of interest (0.5 for 50%)

e: Is the margin of error

The result of equation was 367 students, but the researchers involved the 420 students who responded to the questionnaire.

Tools for Data Collection

One questionnaire was developed by researchers for the collection of the required data after reviewing the following literature (Hasan *et al*., 2020; Alafif *et al*., 2021).

A structured questionnaire, designed to collect comprehensive data, was composed of 4 parts. Each part focused on specific aspects of the study, including socio-demographic characteristics and health habits, patterns of high-energy beverage consumption, factors influencing consumption, and students' perceptions of the risks and benefits associated with high-energy beverages.

Part 1: Socio-demographic characteristics and health habits, such as age, gender, educational level, residence, smoking, sleep pattern, BMI, and exercise.

Part 2: Patterns of high-energy beverage consumption, such as frequency of consumption per week, number of cans per day, and best time for drinking.

Part 3: The factors influencing high-energy beverage consumption, such as activities related to energy drink consumption, and awareness about the significant ingredient.

Part 4: High-Energy Beverage Risk/Benefits Reported by Students. Include 14 yes/no statements regarding the risks/benefits of high-energy beverages.

Tool Validity and Reliability

The survey was developed in English but posted in the native language. A panel of experts and face validities assessed the content. Five independent academics evaluated the first draft of the survey who have previous experience in this kind of study and a statistician to evaluate the survey for correctness, difficulty, clarity, and applicability of the items. The comments delivered by the experts were considered and integrated correctly into the final form of the survey.

Fieldwork

An online survey that was self-administered and created with Google Forms was used to collect data. At the start of the survey, there was a brief explanation of the study and a consent statement. There were no rewards for participating; it was entirely voluntary. Participants could be any interested students enrolled in the selected private university in Cairo through Facebook, WhatsApp, and Telegram, which were among the social media channels used to identify participants.

The survey was administered, and data was gathered from March to May 2024. The survey time and place were scheduled and publicized. The time needed to complete the questionnaire varied from fifteen to twenty minutes.

Pilot Study

An initial study involving thirty college students assessed the questionnaire's scope and the duration needed

to gather data. University students who participated in the pilot study is not included.

Inclusion Criteria

The study sample comprised all enrolled students at the selected private university who confirmed their consent to participate by completing the online questionnaire.

Statistical Analysis

All available data organized into tables to provide an overall and coherent presentation and description of data. A packaged computer analysis program, Statistical Product and Service Solutions (SPSS, version 26.0) (IBM SPSS Statistics for Windows, Armonk, NY) was used for the statistical analysis of these data. A chi-square test was applied to determine the difference between variables.

Ethical Consideration

The researchers obtained ethical clearance from the Research Ethics Committee of the Faculty of Nursing's Research, Modern University for Technology and Information (MTI), Egypt with reference number Egypt-IRB - FAN/141/2024 on 26th February 2024.

RESULTS

Table 1: Percentage Distribution of Students' Responses Regarding Consuming High Energy Beverages (n=435)

Variable	Yes	
	No.	%
Know of any High-energy beverage	361	82.9
Students consume High-energy beverage	240	55.2
First-Time Incentive for Consuming Energy Beverages		
Not consuming	74	17
Friends	222	51
Curiosity	71	16.4
Family	55	12.6
Gym and social media	13	3

Table 1 reveals that (55.2% & 51%) of students who answered the survey consume high-energy beverages and knew about them from their friends respectively.

Table 2: Frequency Distribution of Socio-demographic Characteristics of Students Consuming High Energy Beverages (n=240)

Variable	No.	%
Age		
18-20 years	88	36.7
21-23 years	124	51.7
More than 23 years	28	11.6
Residence		
Rural	150	62.5
Urban	90	37.5
Gender		
Male	157	65.4
Female	83	34.6
Area of Study		
Medical	117	48.8
Non-medical	123	51.2
Level of Study		
First	51	21.2
Second	58	24.2
Third	58	24.2
Fourth	73	30.4

Table 2 shows that around two-thirds of the studied sample (62.5% & 65.4) were from rural areas and were male.

Table 3: Frequency Distribution of Health Habits of Students Consuming High-Energy Beverages (n=240)

Variable	No.	%
Smoking		
Smoker	126	52.5
Nonsmoker	114	47.5
Reported Body Weight		
Normal	214	49.2
Overweight	104	23.9
Obesity	117	26.9
Exercises		
Non	135	56.3
2 times/week	48	20
3 times/week	44	18.3
Daily	13	5.5
Sleeping Hours		
Less than 6 hours	86	35.8
6 – > 8	118	49.2
8 – 10	26	10.8
More than 10	10	4.2

Table 3 illustrates that more than half of students who consume high-energy beverages (52.5 & 56.3 %) were smokers and did not practice any exercises, respectively.

Table 4: Frequency Distribution of High Energy Beverage Consumption Patterns among University Students (n=240)

Variable	Female	Male	Chi-square	*P* value
Frequency of Consumption/ Week				
Daily	9 (10.8%)	43 (27.4%)	27.11	< 0.00001
1 – 2 days /week	41 (49.5%)	83 (52.9%)		
3 – 4 days /week	27 (32.5%)	13 (8.2%)		
5 – 6 days /week	6 (7.2%)	18 (11.5%)		
Maximum Number of Cans Consumed Per Day				
One can only	82 (98.8%)	126 (80.3%)	16.15	0.000058
Two	1 (1.2%)	31 (19.7%)		
Favourite Time of Consumption Throughout the Day				
Morning	14 (17%)	29 (18.5)	0.2365	0 .888491
Afternoon	56 (67.4%)	27 (17.2%)		
Night	13 (15.6%)	101 (64.3)		

significant at p < 0.05

Table 4 explains that around half (49.5% & 52.9%) of female and male students consume high-energy beverages for 1 – 2 days/weeks, respectively. Also, most of the studied samples in both genders consume one can per day. There was a highly significant statistical difference (<0.00001 & 0.000058) between male and female students regarding the frequency of consumption and maximum number of cans consumed per day, respectively.

Table 5: Frequency Distribution of Factors Affecting High Energy Beverage Consumption among University Students (n=240)

Variable	Female	Male	Chi-square	*P* value
The Reason for Consumption Increased With				
Study and exams	50 (60.2%)	74 (47.1%)	47.55	<0.00001
Physical fatigue	6 (7.2%)	30 (19.1)		
Mood change	20 (24.2%)	3 (1.9%)		
Exercises	4 (4.8%)	35 (22.3%)		
It's a habit	3 (3.6%)	15 (23.6%)		
High-Energy Beverage Ingredient Awareness				
Aware	15 (18.1%)	12 (7.6%)	5.9146	0 .015015
Unaware	68 (81.9%)	145 (29.4%)		

significant at p < 0.05

Table 5 Displays a highly significant statistical difference (p=< 0.00001) between male and female students regarding factors that may be increasing the consumption frequency of energy beverages.

Table 6: Frequency Distributions of High-Energy Beverage Risk/Benefits Reported by Consumer Students (n=240)

Variable	Yes		No	
	No.	%	No.	%
High-Energy Beverages Are Good for Health	201	83.8	39	16.2
Increase Alertness	240	100.0	0	0.00
Improve Memory	240	100.0	0	0.00
Relieve Tension	199	82.9	41	17.1
Improve Mood	127	52.9	113	47.1
Empower Physical Activity	240	100.0	0	0.00
Increased Blood Pressure	4	1.7	236	98.3
Palpitation	60	25.0	180	75.00
Increased Heart Rate	53	22.1	187	77.9
Anxiety	3	1.3	237	98.7
Insomnia	169	70.4	71	29.6
Muscle Twitching	52	21.7	188	78.3
Higher Risk of Obesity	70	29.2	170	70.8
Elevated Blood Sugar	0	0.0	240	100.00
Abdominal Pain	94	39.2	146	60.83
Nausea	13	5.4	227	94.6
Increase Urination	164	68.3	76	31.7

Table 6 illustrates that 100% of students consume high-energy beverages because they improve memory, increase alertness, and empower physical activity. Most of the samples studied (83.8%) believe high-energy drinks have a good effect on health.

DISCUSSION

Lately, increasing the marketing and the use of energy drinks seems to be widespread around the world, especially among youth and young adults, especially university students (Aonso-Diego, Krotter & García-Pérez, 2024). This prompt calls to assess the patterns and factors influencing high-energy beverage consumption among university students in a private university in Cairo. The current study revealed that more than half of the students n=240 out of 435 who responded to the survey were drinking high-energy beverages. This highest percentage could be attributed to the research sample's affiliation with a private institution. It is widely known that Egyptian students attending private universities enjoy a decent economic status in addition to their desire to follow in the footsteps of their peers.

A survey conducted in 2016 by Aljaloud in Saudi Arabia revealed that most customers' information on energy drinks came from friends or family. Information from retail establishments came in second (n = 64; 18.9%) and others (n = 57; 16.9%). Less than 10% of college students did, however, state that the majority of their information came from the Internet. These findings were consistent with the research, which found that most university students (n = 222; 51%) received encouragement to drink energy drinks from their friends, followed by curiosity (n = 71; 16.4%), then family (n = 55; 12.6%), and less than (n = 13; 3%) from social media and the gym. This outcome was particularly unexpected, considering how often university students rely on technology as their first source for such information.

In the current study, a higher percentage of male students (65.4%) reported that they consumed energy drinks. Also, Alabbad *et al*. (2019) and Azagba, Langille and Asbridge (2014) studies' findings were similar to the current study results regarding the consumption ratio according to gender. The most possible cause for this perception is the general attitude of young male students, which emphasizes taking more chances, engaging in more physical activity, giving in to peer pressure, behaving carelessly, and leaving exam preparation until the last time, all of which increase stress levels.

In this study, more than half (51.2%) of the nonmedical students drank more energy drinks than medical

students. It was most likely because medical students knew more about the possible adverse effects of certain substances than students at nonmedical universities. This research correlated with a Saudi Arabian study by Alabbad *et al.* (2019). Medical students (62.9%) in the study had knowledge about the constituents of energy drinks compared with the nonmedical students (25%). The results showed that most of male university students (n = 83; 52.9%) use energy drinks weekly, with females having less consumption than males. Most students, male and female (98.8%) and 80.3%, respectively, consumed only one can of energy drink, and more than half of male students (64.3%) consumed energy drinks at night. There was a significant statistical difference between male and female students regarding the frequency of consumption and maximum number of cans consumed per day.

Muhammad *et al*. (2021) and Peacock *et al*. (2017) corroborate the current study results as males are more likely than females to consume energy drinks (ED) because of a variety of factors, including the urge to save time and their propensity for engaging in energy-intensive activities. Curiosity is one of the traits of youth. Females frequently use ED in smaller amounts. Males also reported consuming EDs more frequently and at night on average. Subaiea, Altebainawi and Alshammari (2019) contradict the current study results as they stated in their study that assessed the pattern and bad health effects of energy drinks among the Saudian population, gender did not alter the average energy drink consumption patterns with no statistically significant difference between males and females.

The current study showed that all the university students studied consumed high-energy beverages because they believed they improved memory, increased alertness, and empowered physical activity. Most of the studied sample believe high-energy beverages have a good effect on health. Also, the current study revealed that about two-thirds of the sample studied reported increased urination and insomnia as a result of energy beverage risks.

According to the researcher, since over half of the university students under study did not participate in any form of physical or mental activity that enhances cognitive function, students might think that energy drinks give them greater strength and energy. Alabbad *et al*. (2019) concurred with the findings of the current study, which was conducted to assess the factors influencing the consumption of energy drinks by Saudi University students. Energy drinks help students stay up later at night, engage in more physical activity, and stay alert. Moreover, Subaiea, Altebainawi and Alshammari (2019) in a study done to assess side effects and patterns of energy drinks among Saudia residents, their results revealed that more than half of the samples studied complained of increased urination and insomnia due to energy drink consumption. Therefore, these results matched our research results. Also, congruent with the current study results, Goodhew, Perry and Rehrer (2020) explained in a study done to assess factors affecting energy drinks that frequently experienced adverse effects of energy drinks were sleep disturbance. While contradicting this result, Kobik and Aryee (2024), in a study done to assess the associated factors of energy drink consumption among nurses, reported that less than a quarter of the studied sample (21%) experienced insomnia.

The current study showed a significant statistical difference between male and female students regarding factors that may affect the consumption frequency of energy beverages. Nearly two-thirds of female students' consumption increased with study and exams compared to less than half of male students. There were no significant statistical differences between male and female students regarding awareness of energy beverage ingredients. The increased consumption of energy drinks during exam periods and studies can be attributed to the belief that they enhance alertness, memory, and overall physical health. Users feel that energy drinks help them stay awake longer and improve their ability to gain and retain knowledge.

Disagreeing with this result, Kobik and Aryee (2024), in a study done to assess the associated factors of energy drink consumption among nurses, reported that female students consume energy drinks more than male students. Also, Hasan *et al.* (2020) in a study done to evaluate associated factors of energy drink consumption in public universities, contradicted the actual results as he reported that the highest percentage use energy drinks for no specific reason. In addition, Goodhew, Perry and Rehrer (2020) explained in a study that the most frequently reported cause of consuming energy drinks was that they helped increase awake time.

Limitation

The study's limitations include a non-representative sample from a single private university, reliance on self-reported data, and the lack of exploration into specific energy drink types and long-term effects.

Further studies needed to be carried out with an expanded sample size and involve universities from the governmental and private sectors to compare the outcomes. Social media should raise awareness of the health risks that energy drinks pose to young adults.

CONCLUSION

This research study reveals that more than half of university students regularly consume energy beverages, with two-thirds of consumers being male. Academic-related stress, particularly studying and exams, was identified as the primary motivation for consumption. A significant lack of awareness regarding the ingredients and health risks of energy beverages, combined with misconceptions about their positive health effects, were strongly associated with their use. Gender differences were also evident in consumption frequency and quantity. Given the potential health risks associated with excessive energy beverage consumption, the nursing profession plays a vital role in addressing this issue. Nurses, as educators and advocates, are well-positioned to raise awareness among vulnerable groups, such as young adults in higher education, by dispelling myths, providing evidence-based information, and promoting healthier alternatives. These efforts can help mitigate the adverse health impacts of energy beverages and support students in adopting healthier habits.

Recommendation

It is strongly advised that instructional programs for university students be developed and that they be given access to healthy choices. Developing an awareness program for all vulnerable population through social media regarding health risk/benefits of high energy beverage

Further studies needed to be carried out with an expanded sample size and involve universities from the governmental and private sectors to compare the outcomes. Social media should raise awareness of the health risks that energy drinks pose to young adults.

Conflicts of Interest

There was no conflict of interest at all in this research.

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