Energy drink consumption among medical students of Taif University

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ABSTRACT

Background: Previous studies show that energy drink (ED) consumption was very common among medical students. The study aimed to assess the frequency and pattern of energy drink consumption among Taif University medical students and their knowledge of the effect and side effects of EDs. Methods: A cross-sectional study was conducted using a pretested and validated questionnaire, which was distributed to all medical students in the University, of which we received responses from 256 medical students. The final sample included responses from 207 students who fulfilled the study criteria. All the responses were entered and analyzed through satistical package for social science (SPSS) version 23 by an independent biostatistician. Results: The prevalence of using energy drinks was 74.88%, where a non-significant relationship was present between EDs usage and participants’ age, gender, and academic year. Participants with ages ranging from 21 to 23 years, male students, and those in the 5th academic year significantly believed that EDs are effective. Students in the 2nd and 3rd academic year were the ones who consumed energy drinks daily than others (P < 0.05). The most commonly consumed ED brands were Code Red and Red Bull. Conclusions: There was a high prevalence of energy drinks consumption among medical students. The majority of the participants were aware of the side effects of increased ED consumption. Primary care physicians play an essential role in our society, so they should educate families and young adults about the risk of energy drinks.

Keywords: Caffeine, energy drinks, health effect, medical education

Introduction

Many medical schools have an authoritarian and rigid program that promotes competitive pressure rather than cooperation among students, and studying medicine is considered time-consuming, tedious, and distressing.[1] Thus, to maintain an outstanding GPA, students must push themselves mentally and physically over their limits. A study done by Al-Turki et al.[2] among medical students reported that medical students are more inclined to devour energy drinks than others specialty undergraduates. Energy drinks contain sugar derivatives, including glucuronolactone and ribose, and a mix of stimulants, mainly 80 to 141 mg of caffeine per 8 ounces, which equals 5 oz. of espresso or two 12-ounce cans of caffeinated sodas such as Dew or Coca Cola. They also contain B vitamins, amino acids such as taurine, and amino acid derivatives such as carnitine. These drinks are mainly designed to give consumers a boost of mental and physical incitement, stamina, and alertness, making them more appealing to students. They are freely accessible for everyone to buy at every market and even in Saudi universities with no restrictions applied.[3]

At least 4 billion cans of Red Bull were sold in Austria in 2011 following the company’s launch in 1987. It became the most

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popular energy drink in the world. Since its inception in 160 countries, the market for energy drinks has grown at an average annual rate of 55%.[4] However, despite the fact that energy drinks are marketed to young adults, little research has been done in Saudi Arabia on the consumption habits of medical students. A study was done among medical students in Jeddah, KSA, that more than half of the surveyed students tried energy drinks at least once, and nearly 33.4% consumed them regularly.[5] Another study done by Pettit and DeBarr reported that 22% of medical students consumed energy drinks, 4% claimed to take energy drinks daily, 32% several times a week, and 30% more than once a month.[6]

Evidence shows that consumption of energy drinks tends to be higher amongst medical students and athletes, where perceived stress and the need to concentrate for better performance are reasons for using energy drinks.[7] Palpitations, seizures, headaches, strokes, type 2 diabetes, and renal dysfunction have been linked to the consumption of energy drinks. Symptoms of caffeine intoxication (>=200 milligrams) include anxiety, insomnia, gastrointestinal irritation, muscle twitching, restlessness, and periods of inexcusability.[8] To alert the effects of energy drinks, the Food and Drug Administration (FDA) should put manufacturers to the task of notifying users of the adverse effects of consuming energy drinks. Family physicians in Saudi Arabia should be aware of the health effects of energy drinks as they are becoming increasingly popular among young adults. Although consumption of energy drinks was common among students, the knowledge of ingredients and health risks of energy drinks among medical students was unsatisfactory. Therefore, medical students should be educated in terms of energy drinks and related consequences as they will be involved in educating young people in the future. Thus, our study aimed to assess the frequency and pattern of energy drink consumption among medical students of Taif University and their knowledge of the effects and side effects of energy drinks.

## Methods

A cross-sectional study was conducted from the start of August 2019 to August 2020 at the medical college of Taif University. The Research and Ethics Committee approved the study of Taif University after obtaining written informed consent. A pretested and validated questionnaire was used for data collection, inter-rater reliability of the items was checked, and a Cronbach's alpha value >0.70 for items was considered essential to be included in our questionnaire. The questionnaire included 12 questions about demographic information such as the respondents’ age, gender, academic year, knowledge of the ingredients, and different types of energy drinks along with their preferred type. The items included the time, cause, and frequency of consumption as well as their belief of its effects and their awareness of its side effects, including the ones they experienced.

The online version questionnaire was sent to medical students of Taif University through their official college email address.

We received a response from 256 medical students, of which 207 responses were found to be eligible for the study inclusion. There were no gender differences in the inclusion criteria, whereas students who didn’t consume energy drinks at least one time were excluded.

## Statistical analysis

The responses were initially downloaded in Microsoft Excel following data cleaning transferred to SPSS version 23 for statistical analysis. Qualitative data were expressed as numbers and percentages, and the Chi-square test ($\chi^2$) was applied to test the relationship between variables. A P value less than 0.05 was considered statistically significant.

## Results

The baseline characteristics of the participants showed that 83 (53.5%) were male students, 84 (54.2%) belonged to the age group of 21–23 years, and 34 (21.9%) belonged to the fifth academic year [Table 1]. The analysis showed that 155 students (74.8%) reported using energy drinks. The most consumed energy drink was Code Red (60.6%), followed by Red Bull (21.9%), Bison (7.7%), Powerhouse (3.2%), and Monster (1.3%). There was a statistically significant relationship observed between the age of the students and knowledge regarding the ingredients of the energy drinks (ED), where students in the age group of > 24 years and 21–23 years showed more knowledge than others ($P = 0.011$). However, there were no significant relationships observed for knowledge regarding side effects with any of the baseline characteristics of the students ($P > 0.05$) [Table 2].

It was found that students who belonged 21–23 years age group and male students comparatively thought more that the energy drinks were effective ($P < 0.001$). There was no statistically significant association observed for the time of consumption of ED, frequency of consumption, type of ED consumed with age ($P > 0.05$) and gender ($P > 0.05$) [Table 3]. When we compared the knowledge related to ED effectiveness with

| Table 1: Sociodemographic characters of participants | Frequency | Percentage |
|-------------------------------------------------|-----------|------------|
| **Age (in years)**                              |           |            |
| 18-20                                          | 52        | 33.5       |
| 21-23                                          | 84        | 54.2       |
| >=24                                           | 19        | 12.3       |
| **Gender**                                     |           |            |
| Female                                         | 72        | 46.5       |
| Male                                           | 83        | 53.5       |
| **Year of study**                              |           |            |
| 1st year                                       | 30        | 19.4       |
| 2nd year                                       | 16        | 10.3       |
| 3rd year                                       | 21        | 13.5       |
| 4th year                                       | 31        | 20         |
| 5th year                                       | 34        | 21.9       |
| 6th year                                       | 23        | 14.8       |
students’ academic year, it was students in the 4th and 5th years comparatively reported more that EDs are effective (P < 0.001). Students who belonged to 4th and 6th year consumed EDs at least once a day comparatively more than other students (P < 0.017). When we compared the type of EDs consumed, it was found that 4th-year students had a significantly higher rate of consumption of Bison and Code Red (P < 0.05), whereas 1st-year students showed a higher rate of consumption of Power horse and Redbull (P < 0.05) [Table 4].

When we assessed the reasons for ED consumption, it was reported by 51.6% of the students that it was “Out of habit,” and 32.3% reported that they consumed it while studying. Students in an age group >24 years used energy drinks more “while studying” than other age groups; age group 18–20 used more as out of habit than other age groups with a statistically significant association (P = 0.011). It was found that female students were using EDs comparatively more while studying and males more for exercise and out of habit (P = 0.017). Also, it was observed that 6th- and 4th-year students used energy drinks more “while studying,” whereas 1st and 5th-year students comparatively more used it as “out of habit” (P = 0.002) [Table 5]. The more commonly reported symptoms after ED consumption was “alertness” (38.3%), followed by rapid heart rate (37.6%) and sleep disturbance (15.4%). Rapid heart rate was comparatively seen more in the age group of 18–20 years, whereas sleep disturbance was comparatively more in >24 years (P = 0.032). Similarly, alertness was more reported by the 5th and 4th year
The study findings showed that the frequency of ED consumption was very high among medical students, where the male students had comparatively more usage than females. A study done in Pakistan by Aslam et al. reported that 42.89% of the medical students used EDs. Studies from other regions of Saudi Arabia also gave contrasting reports, where one study from Riyadh province reported higher usage (82.4%), whereas another from Makkah reported a lower consumption rate among (27.7%). The gender differences observed in our study could be explained by the fact that males are more interested in consuming more energy products. In contrast, EDs consumption is strongly associated with a traditional masculinity ideology and risk-taking. The present study showed that more than half of the students knew about the ingredients and side effects of EDs. These findings are consistent with a study by Usman and colleagues in Pakistan, which reported that more than half of the students were aware of the same. Also, a study from Italy reported that awareness regarding EDs’ ingredients was comparatively higher among medical students than non-medical students. This could be due to the fact that medical students may have a better understanding of human physiology and toxicology, and also, there could be cultural differences between different countries in consuming EDs. There were also some crucial differences in gender regarding awareness, where females reported more awareness regarding EDs’ side effects and ingredients. This could also be a reason for increased consumption in the males compared to females. The common reasons given by the respondents related to energy drinks were out of habit, studying, during exercise, and energy needs. These findings are compatible with a past study, which shows that the primary reason for drinking energy drinks was to gain energy while studying and out of curiosity to try it. The present study showed that the frequency of ED consumption was very high among medical students, whereas rapid heart rate was more reported among 1st year students, and sleep disturbance was comparatively more reported by the 6th year students \( (P = 0.005) \) [Table 5].

**Discussion**

The study findings highlighted that the students who preferred most EDs were Code Red, followed by Red Bull. According to the Global Energy Drinks Report, specific warnings were
Family physicians play a critical role in informing students and parents about the dangers of caffeine-containing beverages, especially when combined with alcohol. Thus, it is critical to tackle the issue of ED use by counseling and educating teenagers and their families on the dangers associated with their consumptions. The Committee on Nutrition and the Council on Sports Medicine and Fitness recommend routine counseling of children and adolescents regarding ED intake, and it also emphasizes that water should be the major source of hydration rather than sugary drinks.[20] Studies have shown that techniques such as motivational counseling, the 5 A’s heuristic, and multistage models provide frameworks from which effective changes can be encouraged among medical students in order to reduce their use of EDs. Family physicians can also learn from successful community-based interventions and tailor them to the specific needs of their patients, as well. Educating adolescent patients about calories in terms of physical activity equivalents is a viable approach currently being used in the United States to help them understand their caloric intake.

**Limitations**

Firstly, this was a single institutional study, which was subject to selection bias as the responses of the medical students cannot be generalized to the whole Saudi medical student population, and also there could be region-wise differences in ED consumption. Secondly, we used a self-administered questionnaire that could have resulted in recall bias and social desirability bias.

**Conclusion**

The prevalence of energy drink consumption was very high among medical students, where the male students consumed significantly higher than female students. The most common reasons for consuming energy drinks were out of habit and aid in learning. The majority of the participants were aware of the side effects of increased consumption. Primary care physicians play an essential role in our society, so they should educate families and young adults about the risk of energy drinks. The consumption of energy drinks should be limited, especially for individuals who have cardiac problems and other health conditions. Family physicians could advise the medical students to try other strategies that can help them to increase their cognitive and physical demands during exams nights.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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**Conflicts of interest**

There are no conflicts of interest.

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