

Demographic profile, pattern, practice of energy drink and substance use among undergraduate students in BPKIHS



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ABSTRACT

Background: The consumption of caffeinated energy drinks is a common practice among college students. Energy drinks are believed to increase energy, stamina, wakefulness, and reduce hangover symptoms. **Aims and Objective:** This study aims to find out the profile, pattern, practice of energy drink and substance use among undergraduate students in BP Koirala Institute of Health Sciences. **Materials and Methods:** It was a self-reported questionnaire based descriptive cross-sectional study. The questionnaire included demographic details, patterns of energy drink used, mixing practice of alcohol with energy drinks or other beverages, substance use behavior, and the knowledge about the main constituents of energy drinks. Alcohol mixing practice was further categorized into a) Alcohol + Energy drink mixing group, b) Alcohol + Other beverages mixing group, c) Only Alcohol group. **Results:** Out of 319 students, 188 (58.9%) were male. The prevalence of energy drink use was 186 (58.3%). Red Bull (176, 94.6%) was the most preferred energy drink. The use of alcohol (29, 87.9%), tobacco (20, 60.6%), and marijuana (13, 39.4%) was more prevalent in students using energy drinks on a daily basis. Thirty percent (57) alcohol user students were mixed alcohol with energy drink among them 42 (73.7%) used tobacco and 24 (42.1%) used marijuana. **Conclusion:** The overall energy drinks use among the students was high. The occurrence of various substance misuse was more among those students who consumed energy drink more frequently or consumed it with alcohol. Frequent consumption of energy drinks alone or mix with alcohol is not recommended.

Key words: Alcohol; Diazepam; Energy drink; Tobacco; Marijuana

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INTRODUCTION

Energy drinks constituted high amounts of caffeine containing non-alcoholic beverage, such as Red Bull, Explosion, Hot6, Monster, etc.^{1,2} These caffeinated energy drinks are believed to increase energy, stamina, wakefulness and reduces hangover symptoms. The use of energy drinks alone or mixed with alcohol has been emerging as a high-risk drinking behavior and other substance use liability.^{2,3} Recent studies also suggest that the consumption of energy drinks is associated with higher marijuana, tobacco and other illicit drug use.^{3,4}

In our country, the popularity of the combined use of caffeine and alcohol is growing on. Mixing of energy drinks and alcohol is a common practice among youngsters. Several studies done worldwide have linked many health hazards and increased risk-taking behavior like substance misuse after the frequent use of energy drink alone or combination with alcohol.^{2,5} Although, Food and Drug Administration (FDA) has banned the use of caffeine as a food additive for alcoholic beverages since 2010.⁶ Till date, no study has been conducted in Nepal to observe the pattern and practice of energy drinks and other substance used among undergraduate medical students.

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Thus, this study aims to investigate the demographic profile of students, patterns of energy drinks used, mixing practice of alcohol with energy drinks or other beverages, substance use behavior, and the knowledge about the main constituents of energy drinks among the undergraduate students.

MATERIALS AND METHODS

It was a self-reported questionnaire based descriptive cross sectional study conducted among MBBS (Bachelor of Medicine, Bachelor of Surgery) and BDS (Bachelor of Dental Surgery) students at BP Koirala Institute of Health Science (BPKIHS), Dharan, Nepal. Ethical approval was obtained from the Institute Review Committee (IRC). Before initiation of the study, students were informed about the objectives of the study and written informed consent was taken. Inclusion criteria constituted all the students from both MBBS and BDS disciplines. Those students who did not agree to participate in the study or did not give informed consent were excluded from the study. Confidentiality and anonymity of the participants were maintained.

The sample size was calculated by using the following formula,

$$n = Z^2 \times P(1-P)/d^2$$

where,

n = sample size

p = prevalence of energy drink used in Nepal, 52%.¹

d = margin of error, 5%

Z = 1.96 at 95% Confidence Interval n = 383.54 ≈ 384. By using the formula for finite population correction, $s = n/(1+n/N)$, the sample size for source population of 853 students was $384/(1+384/853) = 264.83 \approx 265$. However, the study was carried out on 319 students. Stratify sampling technique was used to select the sample. Self-prepared semi-structured questionnaire was used for data collection, which was finalized after pre-testing on 30 students from different disciplines. These 30 students were later excluded from the study.

The survey was conducted using a self-prepared semi-structured questionnaire. The questionnaire mainly focused on the demographic details, types, and frequency of energy drink use, mixing practice of alcohol with energy drinks or other beverages, substance use behavior, and the knowledge about the main constituents of energy drinks. Students who had consumed at least one energy drink during the past 30 days was defined as an energy drink user.⁵ The mixing practice was defined as the mixing of energy drink together with alcohol or consumed energy

drink within 2 hours before or in between or 2 hours after the alcoholic drinks.^{7,8}

Based on mixing practice, students were categorized into three categories: a) Energy drinks mixed with alcohol (Alcohol + Energy drink), b) Alcohol mixed with other non-alcoholic beverages (Alcohol + Other beverages), and c) Only alcohol used, not mixed with other beverages (Only Alcohol). All data were coded and entered into Microsoft Excel 2010 and analyzed with SPSS version 11.5 (SPSS Inc). A descriptive statistics such as frequency and percentage was calculated and apply.

RESULTS

Out of 319 students, males was 188 (58.9%) and female was 131 (41.1%). The age of the participants ranged from 17-28 years with a mean age of 21.76 ± 1.81 . The prevalence of energy drink use was 186 (58.3%). About two-third (141, 65%) MBBS and 45 (44.1%) BDS students drank energy drinks. The consumption of energy drinks was more in males (141, 75%) as compared to females (45, 34.4%). Its prevalence among the age group of 20 to 25 years was 169 (60.2%) (Table 1).

The most common type of energy drink preferred by the students was Red Bull (176, 94.6%) followed by Explosion (47, 25.3%). Half of the energy drink user students (92, 49.5%) were consumed energy drinks 1-4 times per week (Figure 1).

On comparing total substance use among energy drink user and non-user students, it was seen more in energy drink user (69.4% vs 50.4%) students. The use of alcohol, tobacco, and marijuana was more among energy drink user students (Figure 2).

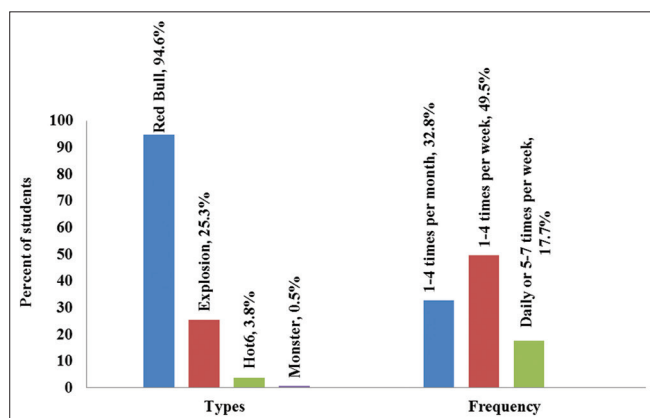
Study results showed that the frequency of consumption of energy drinks also affected the use of substances. The students who consumed energy drinks more frequently (daily or 5-7 times per week) had also more consumption of alcohol (29, 87.9%), tobacco (20, 60.6%), and marijuana (13, 39.4%) as compared to others (Figure 3).

Similarly, 57 students were mixed alcohol with energy drinks; among them 42 (73.3%) used tobacco and 24 (42.1%) used marijuana. The overall use of other substances was more in alcohol mixed with energy drinks group (Figure 4).

Knowledge regarding the presence of caffeine as the main constituent of energy drink in the total energy drink user (186) students was 62.9% (117), whereas 37.1% (69) students did not know the constituent of energy drinks even though they consumed it.

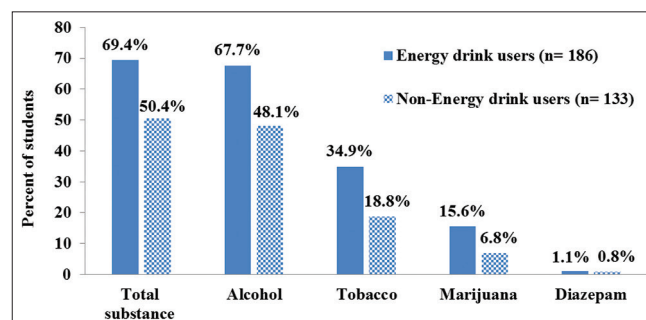
Table 1: Demographic profile of energy drink user and non-user students

Characteristics	Energy drink users (n=186) n (%)	Non-Energy drink users (n=133), n (%)	Total students (n=319) n (%)
Discipline			
MBBS	141 (65)	76 (35)	217 (68)
BDS	45 (44.1)	57 (55.9)	102 (32)
Study years			
1 st year	27 (46.6)	31 (53.4)	58 (18.2)
2 nd year	33 (60)	22 (40)	55 (17.2)
3 rd year	34 (54)	29 (46)	63 (19.7)
4 th year	45 (57.7)	33 (42.3)	78 (24.5)
5 th year	47 (72.3)	18 (27.7)	65 (20.4)
Age group (years)			
<20	12 (37.5)	20 (62.5)	32 (10.1)
20-25	169 (60.2)	112 (39.8)	281 (88.1)
>25	5 (83.3)	1 (16.7)	6 (1.8)
Sex			
Male	141 (75)	47 (25)	188 (58.9)
Female	45 (34.4)	86 (65.6)	131 (41.1)
Nationality			
Nepali	153 (60.5)	100 (39.5)	253 (79.3)
Indian	33 (50)	33 (50)	66 (20.7)
Religion			
Hindu	147 (57.6)	128 (42.4)	302 (94.7)
Others	12 (70.6)	5 (29.4)	17 (5.3)
Ethnicity			
Brahman+Chhetri	89 (63.6)	51 (36.4)	140 (43.9)
Newar+Dalit & Janjati	27 (58.7)	19 (41.3)	46 (14.4)
Madhesi+others	70 (52.6)	63 (47.4)	133 (41.7)

**Figure 1:** Pattern of energy drinks use among the students (n= 186).

DISCUSSION

Medical students are a vulnerable group of population to use energy drinks due to the requirement of constant alertness and mental functioning to combat the burden of academic and clinical activities. Energy drinks contain a high amount of stimulants such as caffeine, Guarana, taurine, etc.² These stimulants may enhance the cross-sensitization between caffeine and other stimulant substances acting through the same neurological pathways.² As a result, energy drink consumers may consume more energy drinks or alcohol and may indulge into the substance misuse. This survey was conducted to study the profile, pattern, practice of energy drink use among the undergraduate students in BPKIHS.

**Figure 2:** Substance use behavior among energy drink user and non-user students.

In our survey, the prevalence of energy drink consumption was 186 (58.3%). A previous study showed that 52% out of 151 college students were used energy drinks in Nepal.¹ Chang et al found that the prevalence of energy drink consumption among undergraduate students in Taiwan was 24.8%, among them 48% used alcohol and 22.7% used tobacco.⁵ Similarly, Friis et al reported that 15.8% of participants used energy drinks weekly basis, in which 26.5% used tobacco, and 44.9% drank alcohol (include both high risk and binge drink).⁹ However, this present study showed a more proportion of energy drink users was consumed alcohol (67.7%), tobacco (34.9%), and marijuana (15.6%) as compared to Chang et al and Friis et al studies.^{5,9} Because the consumption of energy drinks and substances is influenced by socio-demographic factors, education level, peer pressure, independent

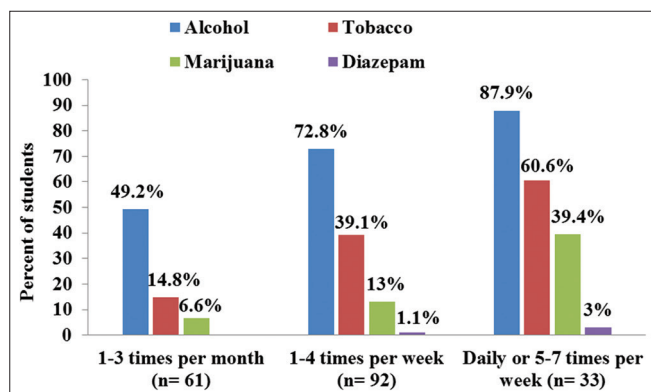


Figure 3: Stratification of substance used based on the frequency of energy drink use.

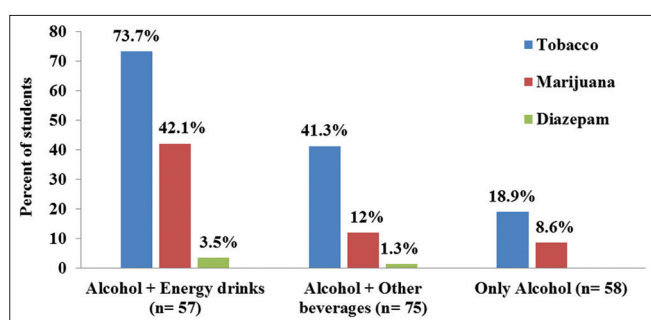


Figure 4: Alcohol mixing practice and other substance used behavior.

lifestyle, stressful activities, psychological factors and many more.^{2,5,10}

It is interesting to find that, a greater proportion of frequent energy drink users (daily or 1-4 times per week) were used more substances. Among daily user of energy drinks, 87.9% used alcohol, 60.6% used tobacco, and 39.4% used marijuana. A study by Polak et al reported that 30.5% of students used energy drink 1–5 times per month; among them 34% used tobacco, 55.9% drank alcohol, and 34.6% smoked marijuana.¹¹ Similarly, 12.6% of students used energy drink more than six times per month; among them 52.1% used tobacco, 63% drank alcohol, and 48.4% smoked marijuana.¹¹ The possible mechanism underlying the use of more substances among the frequent energy drink consumer is that caffeine is a rewarding stimulant, which primes the brain to the additional rewarding effects of the other stimulants.¹² Neuropharmacologic mechanism shows that the use of caffeine reinforces the effects of nicotine and increase the use of nicotinic products. Therefore, tobacco users consume energy drinks and other caffeine-containing substances more frequently and in higher amounts as compared to the non-smokers.²

Furthermore, it was observed that the mixing practice of alcohol with energy drinks is more hazardous than the use of energy drink or alcohol alone. Consumption of

alcohol mixed with energy drink might increase the liability for the consumption of tobacco, marijuana, and other substances. Our study showed that 30% (57) of alcohol user students mixed energy drink with alcohol; among them 73.7% consumed tobacco and 42.1% consumed marijuana as compared to only alcohol users where tobacco and marijuana consumption was 18.9% and 8.6%, respectively. Johnson et al surveyed in the United Kingdom and found that the consumers using alcohol mixed with energy drink were more likely to take illicit drugs (24.9%) and to smoke (25.8%) than consumers using only alcohol.⁷ It may be because caffeine present in energy drinks reduces an individual's perception of being drunk and other substance-related impairment. As a result, individuals may further indulge in various substance misuse.²

This study might help in education, prevention, screening, and policy making related to the risk of energy drink use. Although this study has several strengths, including the investigation of concomitant use of energy drink and other substances, some limitations should be noted. This study is a cross-sectional design, which cannot prove causality between an energy drink and substance use. The data of this study were based on the past 30-day's memory, self-reported and drug-related, which may produce recall and response biases. The sample was only medical students, so the finding of this study cannot be generalized to all Nepalese populations. A further study needs to be done to explore the frequency, amount, reasons and factors that influence the use of energy drink and substances.

CONCLUSION

The overall energy drink use among undergraduate students was high. The occurrence of various substances misuse was more among students who consumed energy drink more frequently or consumed it with alcohol. Frequent consumption of energy drinks alone or mixing with alcohol is not recommended. Preventive measures such as proper counseling and awareness programs about the potential risk of energy drinks and substances are further recommended for the betterment of the students.

Questionnaire availability

The questionnaire used for data collection of this study are available from the corresponding author upon request.

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RPK- Concept and Design of the study, Literature search, Review of literature, Data collection, Statistically analyzed and interpreted data, Prepared first draft of manuscript, Critical review of manuscript and review of the study; **NKM**- Concept and Design, Literature search, Review of literature, Data collection, Helped in preparing first draft of manuscript, Critical revision of manuscript; **BK**- Concept and Design, Review of literature, Critical revision of manuscript, Helped in preparing first draft of manuscript; **GPR**- Concept and Design, Critical revision of manuscript, helped and approved in preparing the manuscript to be published.

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