

Energy Drinks Consumption and Personality Dimensions Among MBBS Students: A Cross-Sectional Study

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Abstract

Background: Energy drinks (EDs) are non-alcoholic beverages containing caffeine, taurine, guarana, L-carnitine, vitamins, and sugar, widely marketed to enhance performance, alertness, and endurance. Their consumption has risen globally among young adults, with limited data from Indian medical students. **Objectives:** To determine the magnitude and pattern of energy drink consumption among MBBS students and to assess personality dimensions using the Big Five Inventory (BFI) in consumers. **Material and Methods:** A hospital-based analytical cross-sectional study was conducted among MBBS students of Government Medical College and Rajindra Hospital, Patiala. Of 1000 students approached, 726 provided valid responses (response rate 72.6%). A semi-structured sociodemographic proforma, a structured questionnaire on ED consumption patterns including brand preference, duration, frequency, and reasons for use, and the Big Five Inventory (BFI) were administered. Data were analysed using SPSS version 25.0 and Chi-square test was applied for categorical comparisons. **Results:** The overall energy drink consumption was 12.5% (n=91/726). Males constituted 62.6% of consumers despite forming 47.1% of the total sample (p<0.001). 3rd year Phase 2 (equivalent to 4th year) MBBS students showed the highest consumption (23.8%). Red Bull (35.2%) and Sting (26.4%) were the most preferred brands. A large majority of consumers were occasional users (83.5%), with daily use being negligible (3.3%), indicating a very low dependence pattern. The most common reasons for consumption were needing more energy in general (39.6%) and studying for exams (36.3%). Among ED consumers assessed on the BFI, personality scores ranked as: Extraversion > Neuroticism > Openness to Experience > Agreeableness > Conscientiousness. **Conclusion:** Energy drink consumption is relatively low (12.5%) among MBBS students at this institution, with the pattern predominantly occasional rather than habitual, indicating minimal dependence. Male students and 3rd year Phase 2 students were the most frequent consumers. Academic stress remains the primary driver. Targeted health education and personality-informed counselling are warranted to prevent escalation of consumption patterns.

Keywords: Energy drinks, caffeine, MBBS students, Big Five Inventory, personality dimensions.

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INTRODUCTION

People have long sought ways to enhance energy and cognitive performance, and energy drinks (EDs) have emerged as one of the most widely consumed stimulant beverages globally.^[1] Energy drinks are non-alcoholic beverages containing high concentrations of caffeine (80–150 mg per serving), sugar, taurine, guarana, L-carnitine, ginseng, and multiple vitamins, marketed as products that enhance stamina, focus, academic performance, and aid in weight loss.^[2,3] Since the launch of RedBull in 1997, more than 500 new ED brands had been introduced worldwide by 2006, representing a USD 5.7 billion industry.^[4]

The consumption of EDs has risen significantly worldwide over the past few decades, with males aged 18–34 years identified as the highest consumers, and nearly one-third of teenagers aged 12–17 years consuming them regularly.^[5] They are freely available at shops and college canteens without adequate regulation or education regarding their side effects.^[4] The Indian ED market has also grown rapidly, with the market size estimated at Rs. 2,400 crore and growing at a compound annual growth rate of 45–50%, driven by increasing affordability and aggressive

marketing.^[6] The Food Safety and Standards Authority of India (FSSAI) has capped the maximum permissible caffeine limit in such beverages at 300 mg per litre.^[6]

Ingredients and their pharmacological effects: Caffeine is the primary active ingredient in EDs and acts as an adenosine receptor antagonist. At standard doses of 200–300 mg, it improves concentration, cognition, mood, and exercise endurance. However, excessive intake is associated with palpitations, insomnia, irritability, anxiety, headaches, raised blood pressure, increased intracranial pressure, and ventricular arrhythmias. The dose-response relationship is well

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characterized.^[7] at 50–100 mg, caffeine increases alertness and blood pressure; at 100–200 mg, it enhances energy and concentration followed by insomnia; at >250 mg, it produces flushing, restlessness, and gastrointestinal disturbance; and at >1 g, it may cause confusion, cardiac arrhythmias, seizures, hallucinations, and respiratory failure. Caffeine fulfils all criteria for being an addictive substance, including dependence, tolerance, and withdrawal.^[4]

Other key ingredients include Guarana (a South American plant rich in caffeine, theobromine, and theophylline), Taurine (a neuroactive amino acid aiding neural growth and osmoregulation), L-Carnitine (promoting fatty acid oxidation and enhancing attention), Ginseng (enhancing memory and immune function), and Yohimbine (an alkaloid with variable cardiovascular effects). Notably, caffeine derived from guarana and other additives is not always listed on product labels, so actual caffeine content frequently exceeds declared amounts.^[2]

Caffeine intoxication presents with nausea, vomiting, agitation, headaches, tremors, tachycardia, arrhythmias, and electrolyte imbalances such as hypokalemia, hypomagnesemia, and hypophosphatemia.^[4] Additional health concerns include obesity, dental enamel erosion, and increased risk-taking behaviour when co-ingested with alcohol.^[3] A systematic review has identified tachycardia as the most commonly reported cardiorespiratory adverse event, followed by palpitations and gastrointestinal issues.^[5]

Energy drinks and medical students: Medical students represent a particularly vulnerable group given intense academic demands, irregular sleep schedules, and pressure to perform, making them susceptible to reliance on stimulants. Studies across various countries have documented notable prevalence rates: 27.2% at a Saudi medical university,^[4] 30% among Syrian medical university students,^[5] and 62% among medical students at a Delhi medical college.^[6] The primary reasons cited across studies include staying awake and increasing alertness while studying, as well as habitual consumption.^[4,5]

Personality traits may also influence ED consumption behaviour. The Big Five Inventory (BFI) assesses five core personality dimensions — Extraversion, Neuroticism, Openness to Experience, Agreeableness, and Conscientiousness — and high extraversion and neuroticism are associated with sensation-seeking and stress-driven behaviours that may predispose individuals to ED use.^[8]

Despite growing global literature, data from Indian MBBS students remain limited. The present study addresses this gap.

Aims and Objectives:

1. To study the magnitude of energy drinks consumption among MBBS students.
2. To estimate the pattern of consumption of energy drinks among MBBS students.
3. To study the personality dimensions in subjects who are consuming energy drinks.

MATERIALS AND METHODS

Study Design: A hospital-based analytical cross-sectional study was conducted among MBBS students of Government Medical College and Rajindra Hospital, Patiala.

Study Duration: Three months (as per the approved protocol period).

Sample Size and Sampling: A total of 1000 MBBS students were approached; of these, 726 students completed the questionnaire and were included in the final analysis, yielding a response rate of 72.6%.

Inclusion Criteria

- MBBS students of any gender between 18–30 years of age.
- Students willing to provide written informed consent.

Exclusion Criteria

- Students with co-morbid medical illnesses or neurological conditions.
- Students who did not provide written informed consent or were uncooperative.

Data Collection Procedure: After obtaining ethical committee approval, participants were briefed about the study purpose and written informed consent was obtained from all. A semi-structured sociodemographic proforma was administered to collect baseline demographic data. A structured questionnaire, developed based on literature review, assessed ED consumption patterns, knowledge, perceived benefits, frequency and duration of use, brand preferences, reasons for initiation and continuation, perceived side effects, and degree of dependence. Students who reported consuming EDs were subsequently assessed using the Big Five Inventory (BFI).

Tools and Instruments

Sociodemographic Proforma: A semi-structured proforma collecting information on age, gender, year of MBBS study, and related details.

Structured Questionnaire on Energy Drink Consumption Pattern: Assessing consumption patterns, knowledge, perceived benefits, and side effects of EDs.

***Big Five Inventory (BFI)^[8]:** A 44-item self-rated inventory measuring personality across five dimensions — Extraversion, Neuroticism, Openness to Experience, Agreeableness, and Conscientiousness. Items are rated on a four-point scale (0 = Never, 1 = Sometimes, 2 = Often, 3 = Always).

Statistical Analysis: Data were entered and analysed using SPSS version 25.0. Descriptive statistics including frequencies, percentages, means, and standard deviations were calculated. Chi-square test was applied for categorical comparisons. A p-value of <0.05 was considered statistically significant.

Ethical considerations: The study was approved by the Institutional Ethics Committee, Government Medical College, Patiala (IEC Registration No. EC/NEW/INST/2023/PB/0383; Approval No. Trg.9(310)2024/21608-610; dated 24 July 2024). Written informed consent was obtained from all participants before enrolment. Participation was voluntary, confidentiality and anonymity were maintained, and the study adhered to the principles of the Declaration of Helsinki and the ICMR National Ethical Guidelines (2017).

RESULTS

A total of 726 MBBS students participated and completed the

questionnaire, yielding a response rate of 72.6% against the target of 1000.

Table 1: Sociodemographic Profile of Study Participants (n=726)

Variable	Category	Frequency	Percentage (%)
Gender	Male	342	47.1
	Female	384	52.9
Age (years)	≤18	11	1.5
	19–24	687	94.6
	25–29	28	3.9
	≥30	0	0.0
Year of MBBS	1st Year	145	20.0
	2nd Year	145	20.0
	3rd Year Phase 1	145	20.0
	3rd Year Phase 2	160	22.0
	Intern	131	18.0

The majority of participants were female (52.9%) and in the 19–24 years age group (94.6%). Students were fairly evenly

distributed across academic years, with the largest group being 3rd Year Phase 2 students (22.0%).

Table 2: Magnitude of Energy Drink Consumption Among MBBS Students (n=726)

Consumption Status	Frequency	Percentage (%)
Currently consuming EDs	91	12.5
Not consuming EDs	635	87.5
Total	726	100.0

The overall energy drink consumption was 12.5% (n=91), indicating a relatively low usage of energy drinks, at this

institution.

Table 3: Gender-wise Distribution of Energy Drink Consumers (n=726)

Gender	Consumers	Non-Consumers	p-value
Male	57 (62.6%)	285 (44.9%)	<0.001
Female	34 (37.4%)	350 (55.1%)	
Total	91 (100%)	635 (100%)	

A significantly higher proportion of males consumed EDs (57/342, 16.7% of all males) compared to females (34/384,

8.9% of all females). Among the 91 consumers, males constituted 62.6% and females 37.4% (p<0.001).

Table 4: Year-wise Distribution of Energy Drink Consumption (n=726)

Year of MBBS	Total Students	ED Consumers	Prevalence (%)
1st Year	145	12	8.3
2nd Year	145	14	9.7
3rd Year Phase 1	145	17	11.7
3rd Year Phase 2	160	38	23.8
Intern	131	10	7.6

A clear progressive increase in ED consumption was observed from 1st year (8.3%) through to 3rd Year Phase 2 (23.8%), which recorded the highest prevalence. Intern students showed the lowest prevalence (7.6%), comparable

to 1st year students, likely reflecting reduced examination-related academic pressure following completion of the MBBS programme.

Table 5: Brand Preference Among Energy Drink Consumers (n=91)

Brand	Frequency	Percentage (%)
Red Bull	32	35.2
Sting	24	26.4
Cola/Pepsi/Coke	10	11.0
Monster	8	8.8
Coffee/Tea	7	7.7
Hell	2	2.2
Others/Sports drinks	8	8.8

Red Bull was the most preferred brand (35.2%), followed by Sting (26.4%), Cola/Pepsi/Coke (11.0%), and Monster

(8.8%).

Table 6: Duration of Energy Drink Use Among Consumers (n=91)

Duration of Use	Frequency	Percentage (%)
≤2 years	42	46.2
3–5 years	21	23.1
6–8 years	15	16.5
9–11 years	11	12.1
≥12 years	2	2.2

The majority of consumers (46.2%) had been consuming EDs for 2 years or less, suggesting predominantly recent

initiation. A small subgroup (2.2%) reported consumption for 12 or more years.

Table 7: Frequency of Energy Drink Consumption (n=91)

Frequency	Frequency	Percentage (%)
Daily	3	3.3
2–3 times/week	5	5.5
Once a week	7	7.7
Occasionally	76	83.5

The overwhelming majority of consumers (83.5%) were occasional users. Daily use was negligible at 3.3% (n=3), and only 5.5% consumed EDs 2–3 times per week.

Combined high-frequency use (daily + 2–3 times/week) accounted for only 8.8% of consumers, indicating a very low dependence pattern in this cohort.

Table 8: Reasons for Energy Drink Consumption (n=91, multiple responses)

+Reason	Frequency	Percentage (%)
Needing more energy in general	36	39.6
Studying for exam/major course project	33	36.3
Increased sleepiness	23	25.3
Others	18	19.8
Driving for long periods	8	8.8
To enhance sports performance	8	8.8
To treat a hangover	7	7.7
While partying	5	5.5

The most common reason for consuming EDs was needing more energy in general (39.6%), followed by studying for

an exam or completing a major course project (36.3%), and increased sleepiness (25.3%).

Table 9: Big Five Inventory (BFI) Scores Among Energy Drink Consumers (n=91)

Personality Dimension	Mean Score	Standard Deviation	Rank
Extraversion	28.6	4.2	1
Neuroticism	26.4	3.8	2
Openness to Experience	24.1	4.0	3
Agreeableness	21.8	3.6	4
Conscientiousness	19.3	3.5	5

Among energy drink consumers, BFI scores ranked as: Extraversion (28.6 ± 4.2) > Neuroticism (26.4 ± 3.8) > Openness to Experience (24.1 ± 4.0) > Agreeableness (21.8 ± 3.6) > Conscientiousness (19.3 ± 3.5).

DISCUSSION

The present study investigated the usage pattern, brand preference, duration, frequency, reasons for use, and personality correlates of energy drink consumption among MBBS students at a government medical college in North India.

Proportion of Energy Drink Consumers: The overall ED consumption in this study was 12.5% (91/726), which is notably lower than figures reported in most comparable studies. Bawazeer and AlSobahi reported 27.2% among clinical-year medical students in Saudi Arabia.^[4] Salem et al. reported 30% among Syrian medical students.^[5] and Hossain et al. reported a considerably higher prevalence of

62% among medical students at a metropolitan institution in New Delhi.^[6] The relatively low prevalence observed in the present study may be attributable to several contextual factors: the government medical college setting with limited canteen-based ED availability, possibly a more conservative cultural and institutional environment and strict rule and regulations in this institution on energy drink consumption and availability. These findings are consistent with the observation by Hossain et al. that affordability and institutional context are significant determinants of ED consumption rates.^[6] The present usage among 12.5% subjects is, however, consistent with estimates from some non-metropolitan Indian settings and comparable to the 17.5% prevalence used for sample size calculation in the Hossain et al. study.^[6]

Gender differences

In this study, males constituted 62.6% of ED consumers despite forming only 47.1% of the total sample. The proportion of male students consuming EDs (16.7% of all males) was nearly

double that of females (8.9% of all females), a difference that was statistically significant ($p < 0.001$). This is highly consistent with international findings: Bawazeer and AlSobahi found 61.5% of their consumers were male ($p = 0.0001$).^[4] and Hossain et al. noted that males dominated daily and weekly consumption categories.^[6] The global pattern of male predominance in ED consumption has been attributed to marketing strategies targeting athletics, masculinity, and modern lifestyles.^[5] Salem et al. reported an atypical female-predominant pattern (63%) among Syrian medical students, which they attributed to local cultural and sampling factors and was not statistically significant ($p = 0.83$).^[5] The present findings firmly support the global trend of male > female ED consumption in the medical student context.

Year-wise distribution: A progressive increase in ED consumption prevalence was observed across years of study, with 3rd Year Phase 2 students recording the highest usage (23.8%), followed by 3rd Year Phase 1 (11.7%), 2nd Year (9.7%), and 1st Year (8.3%). Intern students showed the lowest consumption (7.6%), comparable to 1st year students. This pattern is clinically meaningful: 3rd Year Phase 2 represents the penultimate clinical year of the MBBS programme, characterised by the heaviest academic burden including preparation for the final professional examinations, maximum clinical postings, and highest academic stress levels. This finding is consistent with Bawazeer and AlSobahi, who found 4th-year clinical students had the highest prevalence (50%) among clinical years.^[4] and with Hossain et al., who found a significant association between year of study and ED-related knowledge and consumption patterns.^[6] The marked drop in intern prevalence (7.6%) is a novel and important finding, suggesting that once students complete their MBBS examinations and transition to the internship — where the primary focus shifts from academic performance to clinical skill acquisition — the examination-driven motivation for ED use substantially diminishes.

Brand preference: Red Bull was the most commonly consumed brand (35.2%), followed by Sting (26.4%), Cola/Pepsi/Coke (11.0%), and Monster (8.8%). The dominance of Red Bull aligns with its global market leadership and strong brand recall among young adults. Sting, a widely available and affordable Indian-market brand, ranked second, reflecting the impact of price accessibility on consumption choices — consistent with Hossain et al.'s observation that affordability is a key determinant of ED brand selection in the Indian context.^[6] Notably, 11.0% of students identified cola or carbonated soft drinks as their primary beverage of choice, suggesting a lack of clear distinction between EDs and regular soft drinks, a knowledge gap also identified by Hossain et al., who found that only 49.6% of their consumers could correctly distinguish EDs from sports drinks.^[6]

Duration of use: Nearly half of consumers (46.2%) had been consuming EDs for 2 years or less, consistent with recent market expansion of affordable ED brands in India.^[6] The 3–5 year category (23.1%) likely corresponds to students who initiated consumption around the time of

joining medical school, echoing the pattern noted by Bawazeer and AlSobahi where 20% reported consumption since joining medical school.^[4]

Frequency of use and dependence pattern: The most striking finding in this study was the very low dependence pattern among ED consumers. An overwhelming 83.5% of consumers were occasional users. Daily use was negligible, accounting for only 3.3% ($n = 3$) of consumers, and combined high-frequency use (daily + 2–3 times/week) was seen in only 8.8% of consumers. This stands in marked contrast to Salem et al., who reported 45% daily consumption among Syrian medical students.^[5] and to Hossain et al.'s finding of 15.1% daily use.^[6] The near-absence of daily and habitual use in the present cohort suggests that ED consumption at this institution is largely situational and event-driven — primarily triggered by academic examinations and sleep deprivation — rather than reflecting pharmacological caffeine dependence. This finding is reassuring from a public health perspective, as habitual high-frequency use is the pattern most strongly associated with adverse cardiovascular, sleep, and behavioural outcomes.^[5] However, vigilance is warranted as even occasional use can lead to habituation over time.^[4]

Reasons for consumption: The most common reasons for ED consumption were needing more energy in general (39.6%), followed by studying for exams or completing major academic projects (36.3%), and increased sleepiness (25.3%). This pattern closely mirrors findings across all three comparator studies. Bawazeer and AlSobahi reported general energy need (32.8%) and exam preparation (31.4%) as top reasons.^[4] Salem et al. found gaining energy (30.9%) and maintaining focus (24.8%) as primary drivers.^[5] and Hossain et al. similarly noted academic performance and staying awake as dominant motivations.^[6] The convergence across Saudi, Syrian, and Indian cohorts strongly suggests that academic stress and fatigue are universal drivers of ED use among medical students regardless of geographic or cultural context. The fact that the low overall prevalence and negligible daily use in the present study coexist with the same academic motivators as high-consumption settings suggests that institutional and socioeconomic factors moderate how academic stress translates into ED consumption behaviour.

Personality dimensions: Assessment of ED consumers using the BFI revealed the rank order: Extraversion > Neuroticism > Openness > Agreeableness > Conscientiousness. High extraversion is characteristic of sociable, stimulation-seeking individuals who may be drawn to EDs for their alertness-enhancing and social facilitation effects. High neuroticism reflects emotional reactivity and stress-proneness, which may drive consumption as a coping strategy during academic stress. Low conscientiousness, characterised by reduced self-regulation and impulse control, is consistent with habitual substance use behaviours well-established in psychoactive substance literature.^[9] The predominantly occasional consumption pattern observed in this cohort is, however, consistent with the possibility that while personality predisposition exists, institutional and environmental moderators have limited progression to habitual use. Higher openness scores may reflect curiosity-driven initial experimentation, which — given the low dependence pattern — does not appear to have progressed to regular use in most students.^[10]

Implications: Despite the reassuringly low prevalence and negligible dependence pattern, the findings highlight important areas for intervention. The concentration of consumption among 3rd Year Phase 2 students and male students argues for targeted pre-examination health education programmes specifically addressing healthier alternatives to manage academic stress. The misidentification of cola drinks as EDs by 11.0% of consumers underscores the need for basic education on beverage composition. The small proportion using EDs to treat hangovers (7.7%) or while partying (5.5%), though small, signals risky co-consumption behaviours warranting specific counselling. Hossain et al. emphasised the need for stricter regulations on ED marketing near educational institutions and for integration of health education into medical curricula.^[6] and Salem et al. called for regulatory enforcement on ED sale to young adults⁵ — both recommendations remain relevant even in lower-prevalence settings like the present study site.

Limitations: The cross-sectional design precludes causal inference. Self-reported data are subject to recall and social desirability bias. The study was conducted at a single government institution, limiting generalisability to private or metropolitan medical colleges where prevalence may be substantially higher. Formal questionnaire validation was not conducted, and objective biochemical caffeine assessment was not performed.

CONCLUSION

The prevalence of energy drink consumption among MBBS students at this government medical college was 12.5% (91/726), which is relatively low compared to national and international literature. The consumption pattern was predominantly occasional (83.5%), with daily use being negligible (3.3%), indicating a very low dependence pattern in this cohort. Male students and 3rd Year Phase 2 students showed the highest prevalence, with academic stress and general energy deficit being the primary drivers of consumption. Red Bull and Sting were the most preferred brands. The personality profile of ED consumers was characterised by high extraversion and neuroticism with low conscientiousness, consistent with sensation-seeking and stress-driven patterns. The less proportion and minimal dependence in the present study, in contrast to higher figures from metropolitan Indian and international settings, highlights the role of institutional, socioeconomic, and cultural factors in moderating ED consumption. Targeted health education focusing on senior-year male students, counselling on healthier stress management strategies, and awareness campaigns on ED ingredients and risks remain important preventive measures even in lower-prevalence

settings.

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Conflicts of interest

There are no conflicts of interest.

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