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Research Article

Consumption Patterns of Energy Drinks, Vitamin and Mineral Supplements by Adolescents and Their Association with Body Mass Index

Ruchira Pangtey[1], Pragya Sharma[2], Kriti Ahuja[3], Shiv Kumar[4], Suneela Garg[5]

[1]Senior Resident, [2]Professor, [5]Head of Department and Director Professor, Department of Community Medicine, [3]Intern, Maulana Azad Medical College, New Delhi.
[4]Senior Technical Officer, ICMR, National Institute of Medical Statistics (NIMS), New Delhi.
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Abstract

Background: There has been an increase in the consumption of energy drinks and dietary supplements in India. However, the benefit of regular consumption of multivitamin and mineral supplements still remains questionable.

Objectives: The study was conducted with an aim to obtain data about the type of nutritional supplements and energy drinks consumed by adolescents, reasons for their consumption, with particular emphasis on the effect of consumption on body mass index.

Methods: A cross-sectional study was conducted among 120 adolescents of the age group 14–19 years. Data was collected with the aid of a semi-structured questionnaire. Questions pertaining to diet were asked using a 24-hour dietary recall method and their physical activity was also determined by the questionnaire. The height and weight of the subjects were measured, and BMI was calculated. Data was analyzed using SPSS-17. The Institutional Ethical Committee (IEC) permission was obtained.

Results: In this study, the use of energy/sports drinks over last two weeks period was reported to be 55% and 43% of the respondents reported the consumption of one or the other type of vitamin and/or mineral supplement (s) without assessing any need or consulting any physician. The most commonly consumed vitamins without prescription were Vitamin C (5%) and D (5%), while in terms of minerals, iron (6%) and calcium (5%) were being used by the study subjects without prescription. Some of the reasons for using energy/sports drinks were curiosity followed by peer pressure, whereas students those reported to be consuming reported perceived short-term health benefits and supply by the parents as the common cause. The body mass index has also been found to be associated statistically significant with the consumption of the energy and sports drinks.

Conclusions: Thus, health education programs should incorporate the perceptions, aspirations and motivations of young people into the planning of interventions and activities in order to make them most relevant and effective.

Keywords: Energy drinks, Nutritional supplements, Vitamins, Adolescent

Corresponding Author: Dr. Ruchira Pangtey, Department of Community Medicine, Maulana Azad Medical College, New Delhi.
E-mail Id: ruchirarammohan@gmail.com
Orcid Id: https://orcid.org/0000-0002-6115-9045
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Introduction

Over the years, there has been an increase in the consumption of dietary supplements in India.[1,2] However, the benefit of regular consumption of multivitamin and mineral supplements still remains questionable.[3]

Nutritional supplementation and consumption of sports and energy drinks is popular not only among adolescents playing sports but also among others who simply want an energy boost.[4] Energy drinks have a high caffeine and sugar content and also contain amino acids like taurine.[5] The high caffeine content coupled with excess consumption may cause gastrointestinal upset, cardiac problems, seizures, anxiety, tremors, sleep disturbances, etc.[6] Sports drinks are intended for rehydration and preventing hyponatremia after an intense exercise. However, a study conducted amongst marathoners by Harvard-based researchers found that 13% had some degree of hyponatremia, and that those who took sports drinks during the marathon were just as likely candidates as those who consumed water.[7] But, for those who consume sports drinks without achieving appropriate exercise levels, however, the high sugar and sodium contents are undesirable.[8]

Higher education levels and regular physical activity have been associated with a greater likelihood of dietary supplement use, while individuals with a higher body mass index (BMI) and current smokers are less likely to use dietary supplements. Individuals who use dietary supplements also tend to have healthier diets containing more micronutrients.[9]

Research has shown that consumption of vitamin and mineral supplements by well-nourished individuals does not provide any clear benefit in prevention of cardiovascular diseases or chronic diseases like diabetes. Hence, many healthcare professionals believe that a well-balanced nutritive diet and regular exercise are far more beneficial than the regular consumption of the once-a-day multivitamins that many have been taking to improve health and immunity.[10]

Hence, the ambiguity with regard to need and benefit of nutritional supplements, coupled with the possible adverse effects of inappropriate consumption, makes it imperative to assess and evaluate the validity of consumption of these products.

The aims of the study were:

- To determine the prevalence and pattern of use of energy drinks, sports drinks, vitamin and mineral supplements among adolescents and to study their association with BMI.
- To evaluate the reasons for the use of these products by the adolescents.
- To identify the awareness levels of adolescents about the benefits and risks of these products.

Materials and Methods

Study design and study population

It was a cross-sectional study conducted among adolescents of the age group 14–19 years, who were included from two schools in Delhi – one public and one private.

Sample size

Previous studies of nutritional supplementation[4] have estimated that 40% of people take nutritional supplements. Taking the power of the study at 80% with a level of confidence 95% (alpha=0.05), the minimum sample size for this study comes out to be 84. Assuming a non-response rate of 20% and rounding off to nearest zero, a total of 120 adolescents were contacted for the study. A total of 112 students consented to be a part of the study.

Selection criteria

A list of adolescents between 14 and 19 years of age was made from classes IX–XII from the selected schools. The study subjects were selected using a random number table to arrive at the desired sample size.

Exclusion criteria

Subjects consuming dietary supplements as treatment of a known deficiency state (diagnosed by a registered medical practitioner) were, however, excluded from the study.

Data collection procedures and instruments used

Written permission from the authorities of both the schools was obtained prior to the start of the study. The data was collected on a pre-tested semi-structured schedule. Data on diet, frequency and choice of supplements and sports drinks and reasons for their use was collected with the aid of a semi-structured interview schedule. A dietary history was taken using 24-hour dietary recall method. The height and weight of the subjects was measured using standard instruments and techniques. The BMI of the subjects was calculated after taking appropriate measurements of their weight (in kilograms) and height (in meters) by using the formula:

BMI=Weight (in kg)/[height (in meters)].[2]

The instruments used to measure height[11] and weight[12] were pre-calibrated for zero error. In order to ensure accuracy of measurement of height and weight, measurements were made to the nearest 0.1 cm and 0.1 kg respectively. And a mean of three readings was taken as the final reading to reduce the error.

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Ethical Considerations

The assent form was given to the students between 14 and 17 years of age, a day prior, for signature by a parent/guardian and consent form was signed by the subjects more than or equal to 18 years of age. The subjects were informed about interview and examination procedure in detail before commencing with the study through a subject information sheet. The confidentiality of data was ensured to all the participants. Due permission was obtained from the Institutional Ethical Committee (IEC) prior to start of the study.

Statistical Analysis

The data obtained from the questionnaires were analyzed to observe the choice of supplements and energy drinks along with the frequency, pattern and reasons of consumption. Also, the relation between age and consumption of these products has been analyzed. The association of BMI with the consumption of dietary supplements, energy and sports drinks has been examined from the quantitative data generated.

Results

A total of 112 students responded to the questionnaire. Of these, 57 were males and 55 were females. The mean age of the adolescents in the study was 16.36 years. Most of the respondents were 16 years of age and the age corresponding to least number of respondents was 14 and 18 years (0 respondents) as shown in Table 1.

Table 1.Distribution of Study Participants by Age (n=112)

S. No.	Age in Years	Frequency (n=112)	Percentage
1.	15	25	22.0
2.	16	51	46.0
3.	17	21	19.0
4.	19	15	13.0

Table 2 reveals that almost 55% of adolescents reported to be consuming the energy/sports drinks over last two weeks period; however only 43% of the subjects reported the consumption of one or the other type of vitamin and/or mineral supplement(s) without assessing any need or consulting any physician over last two weeks' time.

Table 2.Distribution of Study Subjects by Consumption of Energy/Sports Drinks

S. No.	Consumption	n(%)
1	Sports/energy drinks	62(55)
2	Vitamins/mineral supplements	48(43)

On enquiring about the "Reason" for the first-time use of sports/energy drinks, majority (42%) of the study subjects responded 'curiosity' followed (22%) by 'motivation by friends' as the reason for consuming the energy/sports drinks for the first time.

Table 3 shows that out of those who reported consumption of energy drinks, most reported consuming them only once or twice a week. Only 1 of the 8 reported a once-a-day consumption on all days over last two weeks. Similarly, the daily consumption of sports drinks was found to be very low and was largely limited to once or twice a week.

Table 3.Frequency of Consumption of Energy and Sports Drinks

S. No.	No. of Drinks per Week	Energy Drinks* (n=112)	Sports Drinks* (n=112)
		Frequency (%)	Frequency (%)
1.	1–2	30 (48.4)	4 (11.8)
2.	>2 but ≤6	18 (29)	27 (79.4)
3.	≥7 (at least once a day)	7 (11.3)	3 (8.8)
4.	Others	7 (11.3)	0 (0)
5.	No Consumption	50 (44.6)	78 (69.6)

*The responses are not mutually exclusive

The rate of consumption of energy drinks was found to be 55.4% whereas the consumption of sports drinks (30.3%) and supplements (43%) among the respondents over last 2 weeks. However, Table 4 reveals that among the energy drinks, 'Red Bull' was reported to be the most (45.2%) commonly consumed drink. However, the consumption of sports drinks was found to be 44.6% among the respondents of which Gatorade (17.9%) was the most commonly consumed.

Table 4.Choice of Energy and Sports Drinks by Brands

S. No.	Energy Drink Brands	Numbers (%) N=62	Sports Drink Brands	Numbers (%) N=34
1.	Red Bull	28 (45.2)	Gatorade	20 (17.9)
2.	Tzinga	17 (27.4)	Powerade	9 (8)
3.	Monster	9 (14.5)	Stamina	1 (0.9)
4.	Power Horse	5 (8.1)	Isotonik	1 (0.9)
5.	Xs energy drink	2 (3.2)	Lucozade	1 (0.9)
6.	Burn	0 (0)	Any other	2 (1.8)
7.	Any other	1 (1.6)		

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Taste, energy boost, and stimulation during examinations were reported to be some of the common reasons contributing to consumption of energy drinks. Since sports drinks were being consumed by students involved in physical activities like playing outdoor games, gymming or involved in other fitness activities, the reasons contributing to consumption were found to be overcoming tiredness after vigorous exercise (53.4%), refreshment (28.3%), and good taste (18.3%).

Tables 5 and 6 reveal that as per the WHO cut-off values for BMI, almost 63% of the study subjects were found to be either overweight (51.2%) or obese (11.6%). Association of BMI >24.99 with consumption of either types of drinks was found to be statistically significant (p<0.001).

Table 5.Distribution of BMI among Subjects Consuming Either Type of Drinks

Students Categories	Numbers (n=43)	Percentage
Underweight (<18.5)	2	4.7
Normal (18.5–24.99)	14	32.6
Overweight (25.0–29.99)	22	51.2
Obese (>29.99)	5	11.6

Table 6.Association of BMI with Consumption of Either Type of Drinks

BMI	Consumption of Drinks		Total	χ2 value, df, p value
	Yes	No		
<24.99	16	48	64	11.32, 1, <0.001
>24.99	27	21	48	
Total	43	69	112	

Among the supplements used over last two weeks, the most commonly (51.2%) consumed supplements were multivitamin and mineral capsules, followed by iron (14%), calcium, vitamin D and vitamin C with 11.6% each. Thus, the most commonly consumed vitamins without prescription were multivitamins available over the counter, while in terms of minerals, it is iron and calcium as shown in Table 7.

Table 7.Subjects by Consumption of Vitamin and Mineral Supplements (n=43)

Supplements	Yes (%)
Multivitamin and multivitamin	22 (51.2)
Iron	6 (13.9)
Vitamin C only	5 (11.6)
Vitamin D Only	5 (11.6)
Calcium	5 (11.6)

In Table 8, the most common reason for consumption of supplements reported by the study subjects was parental advice; however, none reported consumption due to pressure/suggestion by peers/colleagues/friends as a reason for consuming these supplements. Electronic (television advertisement and radio jingles) and print media such as internet, newspapers and magazines also contribute to an extent specifically in subjects who are conscious with respect to their health.

Table 8.Subjects by Reasons of Use of Vitamin/Mineral Supplements

S. No.	Reasons	Numbers (n=43)	Percentage
1.	Because parent has advised for taking the supplements	17	39.5
2.	Because you feel it makes up for lack in nutrients of a balanced diet*	4	9.3
3.	Because of the benefits that you read in magazines/newspapers or see in advertisements in TV or radio jingles	3	6.9
4.	Because parent has advised it and of benefits that you read of, on the internet/in magazines/newspapers or saw in advertisements, both	1	2.3

*Students of senior classes XI and XII

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Only three subjects of the total sample of 112, reported that they consumed protein supplements; with the frequency of consumption varying from once or twice a week to daily for the need to gain body weight since they were gymming for gain in lean body mass.

Discussion

The levels of consumption of energy drinks (55%) and sports drinks (30.4%) by the adolescents are within the range as reported by some other studies.[14,15] With the better availability of these products coupled with media influence promising enhanced performance, the use of energy drinks and supplements is increasing specially among the adolescents. This can also be related to better availability coupled with the level of awareness about these products in the study sample.[16] The rates can also further be reported to be higher in case the study is conducted in the higher age group i.e. students who are above the age of 19 years as some of the researchers also have included university students.[14]

As far as the frequency of consumption is concerned, the frequency ranging once or twice a week to daily consumption has been reported by the study subjects. The BMI has also been found to be statistically significant with the consumption of the energy and sports drinks.

Among the reasons stated for consumption, ability to stay awake during examination time, energy boost in general and taste seem to be common reasons. The findings correspond to the findings of other studies too.[15] The students reported reasons for consumption as energy boost and ability to stay awake during exam time as the perceived benefits of these products. One student reported that he considered these products unhealthy due to the high calorie content (in both energy and sports drinks) and high caffeine content (in energy drinks) and hence did not consume them. Other than this, no other student quoted any particular risk associated with their consumption.

The consumption of protein supplements was also very low, a mere 3% and the respondents stated that body weight gain as a part of gymming was a reason for consumption, which was in the same range as reported by other studies (3.9%).[4] The low percentage could be attributed to lesser number of respondents being involved in gymming, due to high pressure of studies and exams on the students. Also, as was the case with energy and sports drinks, the sample was restricted to student of the 14–19 age group, thus excluding college-going persons of older age, where the consumption may further increase.

Limitations of the current study include smaller sample size which may limit the generalizability of the results. Due to small sample size, a definite correlation with change in body mass index cannot be predicted. Only a set of questions were used, thus limiting the discussion to certain types of nutritional supplements and issues related to perceived benefits.

In this study, 43% adolescents were found to consume vitamin and mineral supplements. The NHANES 2003–2006 survey showed that the use of multivitamins and mineral supplements as 49% and 33% respectively.[13] Another study conducted on 78 students showed that 56.4% consume sports drinks, 48.7% vitamin and mineral tablets, 42.3% (n=38) consumed energy drinks, and 39% high-protein milk supplements (n=3).[4]

Thus, in comparison, the consumption of vitamin and mineral supplements in this study has been seen to be within the same range (43%). Also, among those reporting consumption of these products, multivitamin and multi-mineral supplements are the ones that are most commonly being consumed. Also, in this study, the most commonly stated reason for consumption of these supplements was parental advice. Competition for better performance, media-generated awareness, and health consciousness also serve as reasons for parents to provide supplementation to their children. It was interesting to note that the peer consumption does not seem to be a significant factor. Similar results were seen in a study done in Australia.[4] Hence parental advice seems to be a common factor for consumption of these products worldwide.

This indicated that use of energy and sports drinks is soon catching up as a significant problem among adolescents and youth in our country also. More and more youngsters experiment for better performance without actually understanding the effect of use of these supplements. There is a need to undertake such studies on a larger scale to include a larger and more diverse population especially in terms of age group, in order to obtain detailed information on the scenario of consumption of these products. Since there has been a significant association of BMI with consumption of energy drinks, the awareness on this parameter may also be spread amongst potential consumers, since increase in BMI may also be a risk factor for non- communicable diseases in the later life.

However, this study indeed provides a valuable information that media influences the choices people make in their day-to-day life; thus media should be harnessed for bringing a long-term sustainable behavior change amongst the adolescents and youth for promotion of a healthy life style and nutrition rather than supplements and energy drinks. Also, there should be legislations in place on the advertisement of the energy/sports drinks and their sale in the school canteens and near the school premises.

Conflict of Interest: None

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