

# Energy drinks consumption among football players in Lagos, Nigeria

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**Objectives:** This study assessed the prevalence, frequency and reasons for the consumption of energy drinks among members of registered football clubs in Lagos, Nigeria. A descriptive cross-sectional study design was employed and the study setting was Onikan Stadium Lagos, Lagos State, Nigeria. A simple random sampling technique was employed to select 350 members of the football clubs.

**Method:** A pretested self-administered questionnaire was used to assess the prevalence, frequency and reasons for consumption of energy drinks. Epi Info<sup>®</sup> software (version 6.04) was used for data analysis.

**Results:** Most of the respondents (76.3%) were energy-drink consumers but none of them was a daily user. Most of those who took it (71.9%) drank at least two cans a week. Power Horse<sup>™</sup> was the most preferred choice (58.4%) and more than one-third (37.1%) mixed it with alcohol. The commonest reasons for using energy drinks were leisure (42%), performance enhancement (25.1%) and drinking with friends (25.1%). Single students between ages 21 and 30 years consumed energy drinks more than married, younger or older workers ( $p < 0.05$ ).

**Conclusions:** The majority of the football players were weekly energy-drink users and the commonest reason for consumption was leisure. Although it can be expected that football players consume energy drinks to enhance their sporting performance, it was of concern to find that one-third of the football players mixed energy drinks with alcohol. Education regarding the effects of energy-drink consumption and alcohol is needed among the football players in Lagos.

**Keywords:** energy drinks, football players, Lagos, Nigeria, reasons for consumption

## Introduction

Global energy-drink consumption increased by 14% (i.e. 1.5 billion litres higher) between 2007 and 2011 and had grown by a mean of 10% yearly from 2007 to 2011. More than half of young adults consume a minimum of one can of energy drink monthly and about 6% use energy drinks daily.<sup>1,2</sup> Most energy drinks contain natural products such as guarana, ginseng and/or taurine, but also as much as 50 to 505 mg of caffeine and 35 grams of processed sugar per 8-oz serving. The amounts of guarana, taurine and ginseng found in popular energy drinks are far below the amounts expected to deliver either therapeutic benefits or adverse events. However, the other ingredients with potential interactions such as between taurine and other amino acids and between caffeine and some herbal extracts can create 'synergistic effects especially side effects'. On the other hand, caffeine and sugar are present in amounts known to cause a variety of adverse health effects.<sup>3–5</sup>

Caffeine from plant extracts that contain polyphenol has been associated with positive vascular health and improved blood flow as a result of its antioxidant, anti-inflammatory and anti-cancer qualities. Taurine has also been identified to enhance endurance performance and to aid in the reduction of lactic acid build-up after exercise.<sup>6</sup> Several studies confirm that caffeine consumption can increase energy utilisation, enhance mood and alertness and improve exercise performance.<sup>7</sup> Caffeine and other substances in energy drinks increase pain tolerance, allowing athletes to work out harder and longer thereby leading to enhanced performance.<sup>8</sup> However, if consumed in excess amounts, energy drinks could have adverse effects on health. The adverse reactions and toxicity from high energy-drink consumption stem predominantly from their caffeine content, though the combination of caffeine with the other ingredients has synergistic effects that increase the side effects of energy drinks.<sup>9,10</sup>

Different brands of energy drinks contain caffeine ranging from 50 mg to 550 mg per can or bottle.<sup>10</sup> Caffeine has a long history of safe use and scientific evidence maintains that when consumed in moderation (300–400 mg/day/adult) no adverse effects should occur. However, energy drinks are usually consumed rapidly, unlike coffee or tea. This can quickly increase the concentrations of caffeine and other ingredients in the blood, thereby increasing the risk of side effects. Toxicity from excess caffeine can result in nausea, dehydration, irregular headache, nervousness, irritability, increased respiration, insomnia, hallucinations, poor academic performance, aggressive behaviour, tachycardia and cardiac dysrhythmias, hypokalaemia, paralysis, cerebral oedema, rhabdomyolysis, sudden cardiac death, and psychosis.<sup>11,12</sup> The increasing reports of caffeine intoxication from energy drinks indicate that caffeine dependence and withdrawal could also increase after short-term, high-dose use.<sup>1,13</sup> Taking an excess dose of energy drinks before or during exercise might also be linked to an increased risk of myocardial ischaemia while the elevated sugar quantity in energy drinks contributes to obesity.<sup>14,15</sup>

Some brands of energy drinks are labelled as conventional foods while others are labelled as dietary supplements. Substances that are generally recognised as safe by qualified experts can be added to conventional foods without pre-approval from the FDA; therefore, energy drinks are not properly regulated.<sup>16</sup> This lack of regulation has allowed aggressive promotion of energy drinks in many countries including Nigeria and these promotions are usually targeted towards 18- to 35-year-old highly active and risk-taking consumers and athletes. Athletes are increasingly using energy drinks because of the ergogenic effects.<sup>17</sup> Adolescents and young adults are particularly attracted to energy drinks not

just because of effective product marketing but due to peer influence and lack of knowledge of the potentially harmful effects.<sup>18</sup> The urge to improve performance causes athletes to take energy drinks before contests because the drinks have been promoted as boosting performance and endurance.<sup>15</sup> In spite of the well-documented consequences of frequent and high consumption of energy drinks,<sup>19</sup> little is known about the consumption frequency of energy drinks among football players in Lagos, Nigeria. This study, therefore, determined the prevalence, brand and reasons for consumption of energy drinks among registered football players in Lagos State, Nigeria. This will offer useful information for football players, dietitians, sports professionals, the Nigerian regulatory authority and the media on the use of energy drinks among football players in Lagos State.

## Materials and methods

### Study setting and population

This was a descriptive cross-sectional study and was conducted at Onikan Stadium, which is the headquarters of the Lagos State Football Association (LSFA). Inclusion criteria were football players who are members of the clubs registered with the LSFA.

### Sampling procedure

Sixty amateur football clubs, consisting of 55 men's clubs and five women's clubs, were registered with the LSFA in 2016. Each club had an average of 30 football players, giving a total of about 1 800 football players in the football clubs registered with the LSFA in 2016. The minimum sample size calculated was 301. A simple random sampling technique was used to select 15 clubs and all the members of each club were interviewed to give a total of 350 football players.

### Instrument and pre-testing of instrument

A self-administered questionnaire was used for data collection. The questionnaire was developed from past literature on consumption of energy drinks, especially among football players.<sup>2,3,18–23,29</sup> It consisted of questions on frequency, reasons for use and brands preferred. The questionnaire was pre-tested among 20 football players in one of the clubs that were not selected for the study (based at another stadium) to detect ambiguity, and necessary adjustments were made before the study.

### Ethical considerations

Ethical approval was obtained from the Health Research and Ethics Committee of the Lagos University Teaching Hospital (approval number ADM/DCST/HREC/APP/906). Permission to conduct the research was obtained from the Local Council Development Area. Informed written consent was obtained from each respondent before administering the questionnaire by giving them adequate information about the study and asking them to indicate their willingness to participate in the study. The participants were anonymous and utmost confidentiality of information obtained was ensured throughout the study. The results of the research were communicated with all members of the club after concluding the study.

### Data-collection techniques

Two volunteer postgraduate students from the Department of Community Health and Primary Care, University of Lagos and a

member of staff of the LSFA were trained on the objectives of the study as well as data-collection techniques for uniformity. The researchers supervised the three research assistants during data collection. Data were collected on Wednesdays and Saturdays (when the football players gathered for their meetings) in June and July 2016. Each club was visited twice to make sure that data were collected from all the members of the clubs.

### Data entry and analysis

Data entry and analysis were done using Epi Info® 2002 Windows version (3.5.1) (Epi Info, CDC, Atlanta, GA, USA). A chi-square test was used to test for the level of significance at a *p*-value of 0.05, and also to test for significant associations between categorical variables. A *p*-value of < 0.05 was considered statistically significant.

## Results

### Characteristics of the participants

A total of 350 football players participated in the study. The majority (53.7%) were between ages 21 and 30 years; the mean age was 23.3 ± 5.1 years. There were more men (76.9%) than women (23.1%). The duration of play ranged between one and 20 years.

### Prevalence and frequency of consumption of energy drinks among the respondents

The majority of the football players (76.3%) were energy-drink consumers but none of them drank them daily. Most of those who consumed these (71.9%) drank at least two cans a week. Only 4.5% of the football players consumed energy drinks five or more times per week. Most of them (56.9%) drank 'regular energy drinks' that contain sugar, while more than one-third (37.1%) mixed the energy drink with alcohol (Table 1).

More than half of the respondents (58.4%) preferred the Power Horse™ brand of energy drink. It was the most preferred brand (Figure 1).

**Table 1:** Prevalence and frequency of consumption of energy drinks among the respondents

Consumption	Frequency	Percentage	Cumulative percentage
Prevalence of consumption at least once a week	267	76.3	
Least no. of cans taken per week:		(n = 267)	
One	75	28.1	
Two	137	51.3	79.4
Three	31	11.6	91.0
Four	12	4.5	95.5
Five or more	12	4.5	100.0
Use of regular ED* (n = 267)	152	56.9	
Mixing ED* with alcohol (n = 267)	99	37.1	

Regular ED: energy drink that contains sugar.

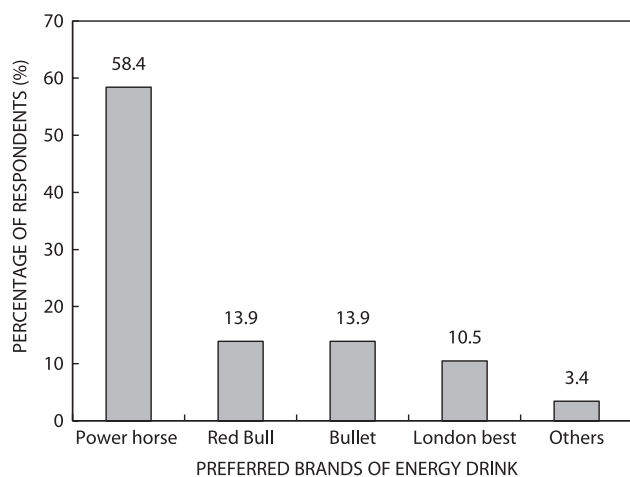


Figure 1: Preferred brands of energy drinks taken by the respondents.

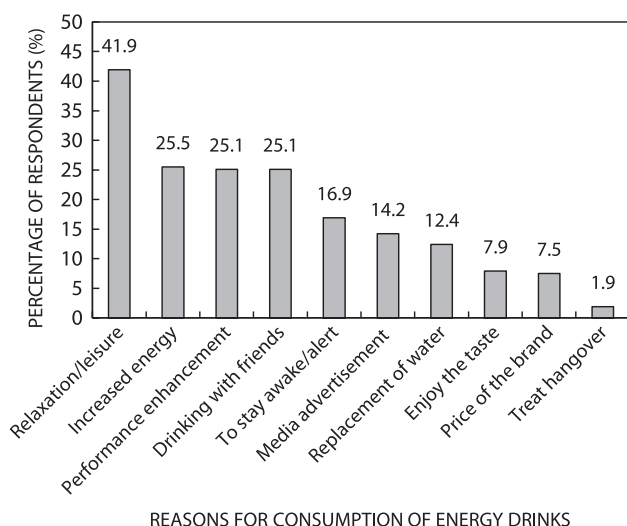


Figure 2: Respondents' reasons for consumption of energy drinks.

### Reasons and factors associated with use of energy drinks

The commonest reasons for consuming energy drinks were relaxation/leisure (42%), increased energy (25.5%), performance boost (25.1%), drinking with friends (25.1%) and enjoying the taste (7.9%) (Figure 2).

Age, marital status, religion and occupation were statistically significantly associated with consumption of energy drinks ( $p < 0.05$ ). Single individuals between ages 21 and 30 years, Muslims and students consumed more energy drinks than married, older and Christian football players (Table 2).

### Discussion

The study determined the prevalence, frequency and reasons for the consumption of energy drinks among football players in Lagos State.

The prevalence of weekly energy-drink consumption among the football players was high (76.3%), similar to reports from Canada (86.7%),<sup>20</sup> Turkey (71.3%)<sup>21</sup> and Ghana (62.2%).<sup>22</sup> Most (71.9%) of those who consumed energy drinks drank two cans a week. This proportion is higher than the prevalence found in Ghana where

Table 2: Factors associated with use of energy drinks

Factor	Consumption of energy drinks		$\chi^2$	p-value
	Consumed (n=267) Frequency (%)	Did not consume (n=83) Frequency (%)		
<b>Age:</b>				
11–20	105 (77.8)	30 (22.2)	12.899	0.002
21–30	149 (79.3)	39 (20.7)		
31–40	13 (48.1)	14 (51.9)		
<b>Marital status:</b>				
Single	227 (79.1)	60 (20.9)	11.554	0.003*
Married	40 (65.6)	21 (34.4)		
Divorced	0 (0.0)	2 (100.0)		
<b>Religion:</b>				
Christianity	174 (73.4)	63 (26.6)	7.422	0.024*
Islam	92 (83.6)	18 (16.4)		
Traditional	1 (33.3)	2 (66.7)		
<b>Occupation:</b>				
Student	161 (82.1)	35 (17.9)	9.077	0.011
Worker	91 (70.0)	39 (30.0)		
Others (Traders)	15 (62.5)	9 (37.5)		

\*Fisher's exact test, significant at  $p < 0.05$ .

most of the participants (62.2%) consumed at least one can of energy drink a week.<sup>23</sup> Lagos football players, however, consume fewer energy drinks than those in Palestine, where most players (56.8%) drank a can of energy drink per day. Consumers of energy drinks are usually classified as high-frequency users if they use them for 52 days or more per year; however, since the population for this study are active, they can be called weekly energy-drink users.<sup>24</sup>

The use of energy drinks containing caffeine, taurine and other potentially harmful substances can be dangerous when used in excess or in combination with other stimulants or antidepressants. It is difficult to set a blanket limit on how many cans of energy drinks can be safely taken in a day but a limit of two servings per day (500 ml of non-concentrated liquid energy drinks) can be considered as the upper limit.<sup>25</sup> A 250 ml can of energy drink contains about 80–100 mg of caffeine. Research shows that moderate consumption of caffeine (< 150 to 200 mg of caffeine per day) has neuroprotective effects, as well as positive effects on mental illness, and fewer signs and symptoms of depression are noted.<sup>26</sup> Adults who consume low to moderate amounts of caffeine have improved exercise endurance, cognition, reaction time and mood.<sup>27</sup> However, consuming high doses can cause anxiety, headache and fatigue, which can occur after short-term, high-dose use (6–15 days of 600 mg/day or more). Caffeine intoxication can cause insomnia, tremors, tachycardia, heart palpitations and upset stomach. At the highest levels (5–10 g), it can induce vomiting and abdominal pain, hypokalaemia, hallucinations, increased intracranial pressure, cerebral oedema, stroke, paralysis, altered consciousness, rigidity, seizures, arrhythmias and death.<sup>10</sup> The effect of each ingredient is as important as the synergistic effects of many ingredients. For example, taurine, one of the other ingredients in energy drinks,

may interact negatively with caffeine and alcohol due to its effect on cell volume and renal-mediated transport and can lead to renal failure.<sup>28</sup>

Energy drinks are either consumed alone, during a meal or mixed with alcohol. In this study, more than one-third of those who consumed energy drinks (37.1%) mixed them with alcohol. This finding is similar to other reports from Los Angeles (87.6%) and France (48.4%), where energy drinks were frequently mixed with alcohol.<sup>3,29</sup> Research has shown that athletes are at high risk of heavy drinking and performance-enhancing drug use. Moreover, males between the ages of 16 and 24 are the highest-drinking age group.<sup>30,31</sup> The synergistic effect of these two factors present in the respondents in this study (athletes and majorly male) could have been responsible for the high use of alcohol.

Consuming caffeinated energy drinks mixed with alcohol (AmEDs) has become an increasingly common feature of the young adult recreational landscape.<sup>32</sup> The combination underestimates the true level of alcohol as well as its related harm and reduces the skewed sense of intoxication because the caffeine in the drinks masks the depressant effect of alcohol without having an effect on its metabolism by the liver.<sup>29,33</sup> Thus, it can result in liver damage, kidney failure, respiratory disorders, agitation, seizures, psychotic conditions, tachycardia, hypertension, heart failure and death. Moreover, consumption of energy drinks mixed with alcohol (AmED) is associated with higher rates of binge drinking, impaired driving, risky sexual behaviour and risk of alcohol dependence when compared with alcohol alone. AmED can alter the subjective state (by decreasing perceived intoxication, enhancing stimulation and increasing the desire to drink) to a greater extent than alcohol alone. Consumption of AmED beverages is riskier for the consumer than alcohol alone.<sup>20,34</sup> A certain study revealed that high-frequency energy-drink consumption (used for 52 days or more in the past year) was associated with greater risk of developing alcohol dependence (as defined by the Diagnostic and Statistical Manual of Mental Disorders, 4th ed.) as compared with low-frequency users and non-users.<sup>35,36</sup> The Nigerian National Agency for Food and Drug Administration and Control recommends that all energy drinks should have warning labels, their use should be limited to 500 ml per day according to the label instructions and they should not be mixed with alcohol.<sup>37</sup>

Football players in this study preferred brands of energy drinks such as Power Horse™ (58.4%) and Red Bull™ (13.9%), which is similar to other studies.<sup>1</sup> This could be due to aggressive marketing by the manufacturers of these two products. Energy drinks have sugar-containing (regular) and sugar-free versions. More than half of the respondents (56.9%) took the 'regular' type of energy drinks that contain refined sugar, which is a known risk factor for obesity and diabetes when consumed in excess.<sup>38</sup>

The commonest reasons for consuming energy drinks in this study (relaxation/leisure, increased energy, performance, drinking with friends and enjoying the taste) are similar to the commonest reasons reported by other studies (increasing energy and performance boost, extending evening leisure periods, improving sports performance, improving the taste of alcoholic drinks or enjoying the taste of energy drinks).<sup>18</sup> Those who use energy drinks before sports or exercise may not experience the diuretic effect of caffeine while the others who use it for relaxation and taste may experience diuresis after use.<sup>12</sup> The proportion who consumed energy drinks because they were

influenced by friends (25.1%) was lower than obtained in Western countries such as Turkey (59.2%),<sup>21</sup> indicating that the effect of peer pressure on consumption of energy drinks in Nigeria is less than in Western countries.

Factors associated with consumption of energy drinks included age, marital status and religion. Older individuals consumed more energy drinks, probably because of higher income and similar to a report from Palestine.<sup>23</sup> Single athletes consumed more energy drinks than those who were married, most likely because they are young and involved in a higher level of risk-taking compared with married people.

### Limitations of the study

The frequency of consumption of energy drinks pre-, during or post-exercise (not just the minimum number of cans per day or week) could have been determined. Moreover, reasons for consuming energy drinks could have been explored further employing a qualitative method of research.

### Conclusions and recommendation

Most of the respondents were weekly energy-drink users, which may not constitute a huge problem in such an active population. A regular brand of energy drinks that contain sugar, a risk factor for obesity, was the preferred type taken and many of them mixed this with alcohol. The commonest reason for using energy drinks was leisure and single students between ages 21 and 30 years consumed energy drinks more than married younger or older workers. Excessive use of energy drinks, especially when mixed with alcohol, should be discouraged among football players in Nigeria. Further research is needed to explore the football players' knowledge concerning caffeine and other ingredients in energy drinks, as well as their reasons for combining energy drinks with alcohol.

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