

CONSUMPTION OF ENERGY DRINKS AMONG PHYSICAL EDUCATION STUDENTS

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This descriptive and cross-sectional study aimed to characterize the pattern of energy drinks consumption in a sample of physical education students through a self-applied questionnaire (socio-demographic data and characterization of consumption). Variables associated with consumption: gender, marital status, attending gym classes, athletic swim practice, and study in the morning. Consumption pattern (n=137): 2.2% once in their lives, 9.5% at least once in the last 12 months, 38% at least once in the last month, 39.4% six times or more in the last month, 10.9% 20 times or more in the last month. Justification for consumption: 54% to improve the taste of alcoholic drinks, 27.7% to extend their evening leisure periods, 13.9% to improve sports performance, 9.5% for stimulation, 8.8% enjoy the taste, 6.6% for curiosity and 4.4% to study. Of those who consumed energy drinks, 87.6% mixed it with alcohol, and 25.9% of the students reported they consume more alcohol when it is mixed with energy drinks. Conclusions: the consumption of energy drinks is associated to sports and drinking alcohol.

DESCRIPTORS: energy drinks; students; sports

EL USO DE BEBIDAS ENERGIZANTES EN ESTUDIANTES DE EDUCACIÓN FÍSICA

Objetivo: caracterizar el patrón de uso de energizantes en muestra por conveniencia de estudiantes de educación física. Estudio descriptivo transversal. Instrumento: cuestionario auto aplicable para datos sociodemográficos y caracterizar el consumo. Resultados: patrón de consumo (n = 137), 2,2 % una vez en la vida; 9,5 % por lo menos una vez en últimos 12 meses; 38 % por lo menos una vez en último mes; 39,4 % seis veces o más en último mes; 10,9 % veinte veces o más en último mes. Ocasiones de consumo: discotecas (75,2%), fiestas (48,9%); bares (38,7%); antes práctica deportes (14,6%), después práctica deportes (5,8%); al estudiar (4,4%). Razones del uso: 54% mejorar sabor alcohol; 27,7% divertirse toda la noche; 13,9% mejorar desempeño deportivo; 9,5% estimularse; 8,8% gustar bebida; 6,6% curiosidad, 4,4% estudiar. Quienes ya consumieron: 87,6 % combinó con alcohol, con vodka (88,3%); 25,9 % consume más alcohol combinándolo. Conclusiones: el consumo de energizantes no sólo se encuentra asociado al deporte sino al alcohol.

DESCRIPTORES: bebidas energizantes; estudiantes; deportes

O USO DE BEBIDAS ENERGÉTICAS ENTRE ESTUDANTES DE EDUCAÇÃO FÍSICA

Este estudo descritivo transversal objetivou caracterizar o padrão de consumo de bebidas energéticas em uma amostra de estudantes de educação física através de questionário auto-aplicável (dados sócio-demográficos e caracterização do consumo). Variáveis associadas ao consumo (p<0,05): sexo, estado civil, freqüentar academia, praticar natação para competição e estudar no período matutino. Padrão de consumo (n=137): 2,2% uma vez na vida, 9,5% pelo menos uma vez nos últimos 12 meses; 38% pelo menos uma vez no último mês; 39,4% seis vezes ou mais no último mês; 10,9% vinte vezes ou mais no último mês. Razões para o uso de energéticos: 54% melhorar o sabor do álcool, 27,7% divertir-se a noite inteira, 13,9% melhorar desempenho esportivo, 9,5% estimular-se, 8,8% gostam do sabor; 6,6% por curiosidade e 4,4% para estudar. Entre os que consumiram energéticos, 87,6% misturaram com álcool e 25,9% dos estudantes afirmaram consumir mais álcool quando o misturam com energéticos. Conclusão: o consumo de energéticos parece estar associado ao esporte e também ao álcool.

DESCRITORES: bebidas energéticas; estudantes; esportes

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INTRODUCTION

For some years now, the market has been flooded by beverages manufacturers call "energy drinks". According to them, these drinks were created to increase physical endurance and resistance, provide better concentration and faster reaction times, increase alertness, avoid sleepiness, provide a feeling of well-being, stimulate metabolism and help eliminatrr harmful substances from the body.

These drinks are readily and widely available wherever young people get together to dance, in clubs, bars, gyms, sports facilities and concerts⁽¹⁾, where they are drunk straight or mixed with alcoholic drinks.

This consumption, especially when mixed with alcohol, is becoming customary among the youth, with cocktails becoming new and dangerous factors for health. The SEDRONAR – Argentinean agency responsible for the programming of prevention actions against drugs addition and the fight against drugs traffic is keen on spreading alerts about this kind of consumption. Another issue that comes up is that the consumption pattern of alcoholic beverages, especially distilled drinks, is changing due to mixtures and improvement of taste, which would lead to higher levels of alcohol consumption⁽¹⁾.

The risks associated with high levels of caffeine seem to be the most common problem with these drinks when compared to their other ingredients. Most of these drinks have taurine, caffeine, guaraná, ginseng, glucuronolactone and vitamins as their main ingredients. Some also contain minerals, inositol and carnitine, among other substances. Many of these components are derived from plants. Some ingredients are classified as adaptogens, since they help stabilize the functions of the body system altered by tension.

Caffeine is the most frequently ingested psychoactive substance in the world. For some time it has been considered an "ergogenic" substance in sports performance, but controlled studies have existed for only one decade now, which clearly demonstrate its efficacy in relation to endurance exercises.

Within sports medicine, an "ergogenic agent" can be defined as any mechanism, physiological, nutritional or pharmacological effect capable of improving the performance of physical or occupational activities. Three types of ergogenic agents are considered: physiological, nutritional and

pharmacological. Nutritional ergogenic agents are characterized by the application of strategies and by the consumption of nutrients with highly-variable degrees of efficiency. Many athletes use several nutritional supplements, most of which have no scientific confirmation of ergogenic effectiveness⁽²⁾.

According to the ANMAT – National Food and Medical Technology Administration, in order to be considered dietary supplements, energy drinks in Argentina should change the maximum values of their components: the current percentage of caffeine (35mg/100mL) should be decreased to 20 mg/mL, representing a total decrease by 143%.

Potential risks of energy drink consumption would be increased by using them concomitantly with other substances, like in the case of alcohol. This could lead to a series of disorders, such as seizures, arrhythmias and sudden deaths. Additionally, energy drinks seem to delay the depressing effects of alcohol, leading to a higher consumption of alcoholic drinks⁽³⁾.

Undoubtedly, the most dangerous aspect of using ergogenics is in playing down the effects of physical training. As athletes resort to these agents, the common person seems to believe that physical exercise is only effective when associated to an ergogenic agent, and the efficacy of physical activity associated to a balanced diet seems to be put in question more and more by the population.

There are few studies in literature about the usage of energy drinks among the young, whether as an ergogenic agent in sports, recreational use, mixed with alcoholic drinks or drunk straight. Therefore, the present study aimed to characterize the drinking pattern of energy drinks among physical education students from an institution in Rosario, Argentina. The results obtained are expected to serve as a basis for future educational health programs directed to the youth, especially to potential physical education teachers.

METHOD

This is a quantitative, descriptive and cross-sectional study. The participants were fourth-year students in a Physical Education course offered in Rosario, Argentina.

The *Instituto Superior de Educación Física* is a province-owned institution, located in the central zone of Rosario. Three schools are part of this

institute. One of them is the *Escuela de Profesorado de Educación Física* (EPEF), with an initial level and first, second and third cycles of general basic education and poly-modal education in physical education. The school grants a Teacher of Physical Education degree, with the requirement that aspiring students have finished secondary (high school) education. In the year of investigation, this course had 1,541 students (845 male and 696 female) enrolled in one of the four years needed to finish the course program.

A non-probabilistic sample was chosen for convenience. The inclusion criteria were: students over 21 years of age, taking the fourth year of the physical education course, regularly enrolled, present at the time of application of the questionnaire and who signed a term of consent to participate in the research. Students who did not fit these criteria were excluded. The 4th year student population consisted of 364 people, but the total sample was made up of 211 students.

Data were collected with a self-administered questionnaire, based on the author's professional experience and on the questionnaire on the drinking pattern of energy drinks, used in a study by the department of Psychobiology at the Federal University of São Paulo (UNIFESP)⁽¹⁾.

In order to elaborate question #16, referring to "what do you want when you drink these beverages?" and question #18 about "If you have tried energy drinks but have never drunk them again, could you tell us what the reason was not to drink them again?", a meeting was held with students at a nursing school, and the categories including the aforementioned questions were obtained after a brainstorming exercise.

The final instrument was composed of two parts, one referring to sociodemographic data and sports practiced by the subjects, with eleven structured yes/no questions, dichotomic and multiple-choice, and a second part referring to the pattern of consumption of the beverages, with twelve structured yes/no and multiple-choice questions.

Data were collected on six non-consecutive days between October 31 and November 10, 2005, with the questionnaire being applied to all eight divisions of the fourth year of the course. Data collection started after approval had been obtained from the authorities of the *Escuela del Profesorado en Educación Física*, the Directive Council of the institution and the Research Department. Data were

collected at the beginning of morning and afternoon classes, and the coordinator of each class period was responsible for introducing the researcher to the teacher-professor in charge, arouse their interest in the project and obtain authorization for data collection, which should not take more than ten minutes of class time. With the students, the researcher explained the goals of the questionnaire that oriented each instrument. It was mentioned that this investigation aimed to get to know how energy drinks were consumed, a situation that had not been studied comprehensively in the city, and that the information would be capable of sustaining future health education programs for the youth. The students were informed that anonymity would be guaranteed, and that data served for scientific purposes only. Also, the students were informed that they were not obliged to take part in the study, and that those who wished to participate should sign a consent term. After the instruments had been filled out, they were collected and stored for later classification.

For analysis, the data were organized in Microsoft Excel and processed with EPI INFO statistical software version 3.2.2 for Windows. Frequencies, percentages and averages were used for descriptive data analysis. For analytical analysis, Pearson's chi-square test was used, considering a reliability interval of 95%.

The project was assessed by the Bioethics Commission of the School of Medical Sciences at Rosario National University and, after its approval, field work started.

RESULTS

Sociodemographic characteristics:

Regarding gender, 114 sample members (54%) were men. The students' average age was 22 years and six months (min=21 years old, max=38 years old, sd=2.25). Regarding marital status, 191 (90.5%) reported being single/divorced and only nine (4.3%) mentioned having children.

Asked about their hometowns, 135 (64%) referred Rosario. Regarding who they lived with, 165 (78.2%) reported living with their families.

As for occupations, 163 (78.2%) stated either regular or sporadic jobs. When asked about other sports activities practiced outside school, 113 (53.6%) mentioned exercising in a gym, either regularly or sporadically.

Regarding competitive sport practices, a wide range of responses were registered. The most frequent were: swimming (n=42; 19.9%); soccer (n=41; 19.4%); weight-lifting (n=18; 8.5%); volleyball (n=15, 7.1%) and basketball (n=13; 6.2%).

Among those who practice for competition (n=143), on the average, 3.66 (min=1, max=7, sd=1.46) days per week were used for training.

As for their studying hours at the institute, most study only one period, with 99 (46.9%) students taking morning classes and 106 (50.2%) taking evening classes.

Consumption of energy drinks

Regarding the consumption of energy drinks, 137 (64.9%) subjects reported previous consumption, while 74 (35.1%) said not having done so.

Table #1 shows the numeric and percentage distribution of sociodemographic variables in the total sample, according to the use of energy drinks.

Table #1 - numeric and percentage distribution of sociodemographic variables in the total sample, according to the use of energy drinks (n=211). Rosario, 2005

Variables	Use of energy drinks		χ^2	P
	YES N (%)	NO N (%)		
Gender			4.08	0.043
Female	56 (57.7)	41 (42.3)		
Male	81 (71.1)	33 (28.9)		
Marital Status			3.85	0.049
Single / Divorced	128 (67)	63 (33)		
Married / Living with Partner	9 (45)	11 (55)		
Hometown			1.70	0.191
Rosario	92 (68.1)	43 (31.9)		
Other cities	45 (59.2)	31 (40.8)		
Living with			0.23	0.632
Alone / With friends	26 (68.4)	12 (31.6)		
Family / Spouse	110 (64.3)	61 (35.7)		
Works?			0.082	0.774
Yes	105 (64.4)	58 (35.6)		
No	32 (66.7)	16 (33.3)		
Studying hours			5.068	0.024
Morning	71 (71.7)	28 (28.3)		
Evening	60 (56.6)	46 (43.4)		

Considering that 137 students stated having consumed energy drinks before, table #2 helps visualizing how this consumption happened, showing the distribution of the subjects according to the consumption patterns, the occasions when the drinks were consumed and what they want when they drink these beverages, either straight or mixed with alcohol.

Table #2 - numeric and percentage distribution of sample members who report previous consumption of energy drinks, according to consumption characteristics (n=137). Rosario, 2005

	N	%
Consumption pattern of energy drinks:		
Once in their life	3	2.2
At least once in the last 12 months	13	9.5
At least once in the last month	52	38.0
Six times or more in the last month	54	39.4
20 times or more in the last month	15	10.9
Occasions when energy drinks were consumed		
Parties	67	48.9
Before practicing sports	21	15.3
After practicing sports	8	5.8
For driving vehicles	5	3.6
In nightclubs	103	75.2
In bars	53	38.7
For working	5	3.6
For studying	6	4.4
Other occasions	5	3.6
What do they want when they consume energy drinks		
Improve sports performance	19	13.9
Enjoy an all-night party	38	27.7
Improve the taste of alcoholic beverages	74	54.0
Stimulation	13	9.5
Enjoying the drink	12	8.8
Being able to study longer	6	4.4
Curiosity	9	6.6
Other	4	2.9
Consumption of energy drinks mixed with alcohol		
Yes	120	87.6
No	17	12.4

Energy drink consumption associated to sports practice

A significant statistical association was found between using energy drinks and belonging to a gym. Among the students who belonged to a gym, 82 (72.6%) consumed the energy drinks, against 55 (56.1%) among non-members ($\chi^2=6.232$; $p=0.012$). As for sports practice aimed at competition and the use of energy drinks, a significant association was found between practicing swimming and using energy drinks ($\chi^2=3.62$; $p=0.044$).

Energy drink consumption associated to alcoholic beverages

Among the students consuming energy drinks (n=137), 120 (87.6%) stated that they drink these beverages mixed with alcoholic drinks, while seven (12.4%) said not having consumed this mixture.

Shows this consumption of energy drinks associated to alcoholic beverages.

Table #3 - Numeric and percentage distribution of sample members who mentioned having consumed energy drinks with alcoholic beverages, according to characteristics for this consumption (n=120). Rosario, 2005

	N	%
Type of alcoholic beverage mixed with the energy drink:		
Beer	17	14.3
Wine	27	22.5
Whiskey	15	12.5
Vodka	106	88.3
Tequila	4	3.3
Champagne	32	26.7
When consuming alcoholic beverages mixed with energy drinks, subject feels that he/she:		
Drinks much less	6	5
Drinks a little less	11	9.2
Does not drink more or less than usual	72	60.0
Drinks a little more	23	19.2
Drinks much more	8	6.7

DISCUSSION

The results evidence that the use of energy drinks is frequent (from one to six occasions in the last month) among these students, who have chosen physical activity as their future occupation. Athletes in general, particularly those who play highly-competitive sports, always show interest in new products that promise to improve their performance or recovery. As such, dietary supplements, among which energy drinks are classified in Argentina, are a strong temptation for these athletes. The attraction of energy drinks shows the energizing of body and mind, and is made for moments when physical stress is higher. Manufacturers recommend the drinks for sports that require high levels of energy (such as cross-country running, mountain climbing, skiing) and that its use is indicated both during and after sports practice⁽⁴⁾. In this study, when students were asked about what sports they played, swimming was found to be associated to consuming energy drinks, aiming to improve individual performance. Sports performance cannot be conceived if strength quality is not improved. Strength, as well as stamina, are the qualities that can develop most through adequate training, independently from structural and external aspects. Weight training, particularly, is capable of improving strength quality in a short period⁽⁵⁾. One of

the key principles of muscle development during sports training is that muscles that work without weights, even when exercising for hours, have very low improvements in strength. However, muscles that contract at maximum or quasi-maximum strength develop muscle strength very quickly, especially if these contractions are repeated through the day. According to this principle, muscle development experiments show that the execution of six maximum-strength or quasi-maximum-strength muscular contractions in three separate series, three days a week, produces an optimal improvement of muscular strength without producing chronic muscle fatigue⁽⁶⁾.

In the sample, the practice of attending a gym for training outside their class hours, either regularly or sporadically, also showed an association with the consumption of energy drinks. This higher usage of the drinks in training situations may be due to the impact of communication means and energy drinks advertisements promising increased performance during and after intense exercise. However, when gym-goers participated in another investigation, it was shown that most of them did not know the purposes intended for energy drinks and their nutritional benefits. They mentioned that they knew that these beverages contained no alcohol, did not permit the elimination of toxins produced during physical activity and did not believe that they could cause cardiovascular disorders⁽⁷⁾.

Regarding other sociodemographic characteristics, significant associations were identified between the consumption of energy drinks and being male and single or divorced. This explanation can come from literature, where it is shown that men drink more than women, and single or divorced people drink more than married people. As for the association between a higher consumption of energy drinks and studying in the morning, it can be inferred that students who study in the evening can maintain other activities, such as working in the morning, which limits their free time to go out at night, when energy drinks are usually consumed. However, this is only a hypothesis that should be studied further.

Since energy drinks with English-language brands have flooded the market since the beginning of the 21st century, magnifying energy, stamina and strength, thousands of young people, far from consuming them for sports activities, enjoy them only

on different occasions, aiming towards an ergogenic effect that allows them to study, work and attend to their personal entertainment needs. The possibility of freely buying and consuming on non-sport-related occasions is sustained through commercials from different manufacturers, exposing research-based positive effects of the energy drinks on physical performance, improving aerobic and anaerobic resistance and psychomotor performance (reaction times, concentration and memory)⁽⁸⁻⁹⁾.

This is how the young students from the sample revealed that the occasions where they most consume these drinks are nightclubs, bars and parties, all of them entertainment situations, far from training and sports. When they drink them, the students aim to have enough resistance to spend the whole night partying, as well as to improve the taste of alcoholic drinks. These data are in accordance with a Brazilian study⁽¹⁾.

As for experimental use of energy drinks, this effect may be the result of marketing strategy pressures on the youth, who feel the need to consume alcohol and other drinks in order to be included in groups whenever they are in places where young people usually meet, such as nightclubs.

Consumption of energy drinks mixed with alcohol is more and more frequent among the young population, and this sample of physical education students was no exception.

In a project done by the Department of Psychobiology of the Federal University of São Paulo, data on the use of energy drinks by young people were found, showing that this consumption is mostly associated to the use of alcohol⁽¹⁾. In this study, the main objective of mixing energy drinks with alcohol is to improve the taste of the alcoholic drink, since vodka, a bitter, highly-alcoholic beverage, is the liquor most often mixed with energy drinks. It seems that the youngsters do not want to miss the opportunity of consuming this beverage with a high alcohol content, which allows them to feel the enjoyable effects of alcohol, but avoiding the bitter taste. Thus, consumers try to mix them, not with juice or soda, but with energy drinks, aiming for a double effect. While research is scarce on the interaction between energy drinks and alcohol, there is some evidence that this mixture increases the properties of alcoholic excitation or decreases its depressing effects⁽¹⁾. This would allow the youngsters to reach their goal of having fun all

night, drinking alcohol, but without incurring its depressing effects: sleepiness, tiredness and drunkenness. Still, while energy drink advertisements point out that they help to avoid tiredness and improve performance, scientific research suggests that these drinks improve neither performance nor alcohol-induced alterations due to heavy intake⁽¹⁰⁾. In the sample, 25.9% stated that they drink more alcohol when it is mixed with energy drinks. This behavior may be based on having the taste improved by the mixture, allowing for a higher ingestion of alcohol.

Considering that students are future physical educators, a way of life that favors a healthy and sound lifestyle, both athletes and educators in sports and physical activity should be informed about these products, their benefits and risks, and look for other foods or liquids that do not pose potential risks and damage for health⁽¹¹⁾.

The message to the general community is that, with sports practices being an important part of popular culture, there are no other substitutes other than training and good eating habits.

FINAL CONSIDERATIONS

Since the sample was made up of physical education students, the researchers hoped to find the use of energy drinks strongly associated to sports practice at the beginning of the study. Even though this association is apparent, its frequency is lower than the association with alcoholic drinks at parties, in bars and nightclubs.

The students were interested in improving the taste of alcoholic beverages, and a considerable number also mentioned consuming more alcohol when they drink this mixture.

Although energy drinks are freely traded, advertised by producers as an indispensable element for athletes aiming for the replenishment of nutrients and energy, in practice, they are drunk in bars and nightclubs, and their intake seems to contribute to risky alcohol abuse by youngsters.

Furthermore, it should also be acknowledged that the risk of consuming energy drinks is based only on its combination with alcohol and other psychoactive substances, not on the "toxicity" of the lifestyle imposed on the young population, since these are offered acceleration, lack of control and abnormal performance.

As such, further studies are important to clarify how the association between alcohol and energy drinks happens, if the consumption of this sort of mixture increases the intake of alcohol and how both substances interact. This situation is shown more and more frequently among the young, and more data are needed to clarify whether it is harmful for health or not.

Youngsters need to be oriented to acknowledge that, as future physical educators, they should incorporate and be able to share with others that, in order to succeed in sports practice, good hydration and adequate food intake are necessary, offering enough energetic support without the need for other supplements.

These results denote the importance of and need for interventions to prevent this consumption of energy drinks, with simple orientations to reduce their use aimed at the young, and also to reinforce the importance of adequate eating and hydration habits to achieve good performance in sports, as well as to

prevent the risks associated to ingesting energy drinks mixed with alcohol.

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