

Study of the Factors that Enhance Consumption of Carbonate Drinks (Energy Drinks) among Community Group in Qassim Region, Saudi Arabia

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Abstract **Study Design:** This was cross sectional study conducted among a sample of group of population in Qassim region in Kingdom Saudi Arabia. **Objectives:** The study aimed to identify the most common factors that enhance the consumption of energy drinks taking into account all demographic issues and other community variations. **Methods:** The baseline information collected by a pre-designed questionnaire distributed among different nationalities and work disciplines. The sample consisted of (900) respondents only (320) of them reported drinking energy drinks regularly (at least one can per day). The study then focused only on those who reported drinking the energy drinks and they were accounted (35.6%) of the total of the sample size, where (246) of them were male, and (74) female, with ages ranging from 18 to more than 45 years old. The study excluded age less than (18) because behaviors within this age group are commonly not based on knowledge but may be only a matter of mimicry. The majority of the respondents were Saudi (74.4%) while non-Saudi were (25.6%). **Results:** The study revealed a significant association between the rate of drinking energy drinks and gender (p -value (.034), with percentage of (46.3%) and (10.9%) for male and female respectively. The study showed that sleeping rate decreased by consumption of energy drinks up to (26.3%) from the normal rate ($\eta = 0.189$), There was strong association with sleeping rate (p value (.002). Most common factors that enhance energy drinks among male were improving sport performance (20.6%), while feeling energy and active was the main factor among female (4.0%). **Conclusion:** The study concluded that many people from different discipline are using energy drinks as a part of daily habits. Energy drinks well known and commonly used are Red Bull, Power Horse, Bison, Bugzy, Code Red, and others. In most cases they are used without a full knowledge about their components or evaluation of the potential benefits and risks associated with their use.

Keywords Energy drinks, Carbonates, Qassim, Consumption, Caffeine, Soda, Soft drinks

1. Introduction

Most of current studies are showing that, new energy drinks become available in the Middle East as general and specifically in Saudi Arabia. These drinks are widespread among students in different education levels [1]. Although some regulations issued by the council of ministries to control the advertisements and the distribution of free energy drinks to consumers of all age groups but still more efforts are needed. In the present, the sale of energy drinks is prohibited in public restaurants, government establishments, education and health facilities government and sports clubs [2, 3]. Globally the energy drinks were identified for the first time by Japanese in the year (1960),

the target was to increase energy. Some beverages, such as Lipvitin-D, have contains a number of essential vitamins which commonly used in humans food as nutrients, as well as taurine and niacin, which are metabolites. Some studies have shown that they stimulate energy and increase concentration. (1987) Dietrich Mateschitz, the Austrian, who added caffeine and other elements such as sugar and caffeine produced some energy generation which was named as (Red Bull), and then added the amino acid taurine. In (1997) Red Bull has been marketed for the first time mainly in the United States, Thus, adding of food ingredients continued and other energy products (Monster Energy Drink, 5-hour Energy) were replicated during the period 2002 and 2004, respectively. In 2005, Phusion Pharmaceuticals invented alcoholic beverages (through the addition of alcohol) and produced the energy drink known as "Four Loko" [4].

The consumption of the energy drink depends on two major factors which are the strong effect of the advertisements and feeling of addiction, for that energy drinks are common among youth who always try to detect

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the new issues and improve their life experience.

According to the National Center for Complementary Health and Integrity (NCCIH), energy drinks may generally be considered as a product that increases energy, physical and mental (intellectual) performance, in addition to containing a number of vitamins. Energy drinks are commonly used among teenagers and young Americans as a dietary supplement especially among males between the ages of 18 and 34, and use different types of energy drinks. Studies have shown that the proportion of consumers of energy drinks up to one-third of the 12- to 17-year-olds of the males. [5].

The most essential ingredient in all types of beverage (energy drinks) is caffeine. As it can be up to 500 mg of caffeine in each can (this amount is equal to four to five cups of black coffee). The energy drink can also contain some other caffeine derivatives or substances that contain caffeine at different rates such as (Brazilian cocoa), and also includes different levels of sugar, taurine, ginseng, B vitamins, glucuronolactone, yohimbe, carnitine, bitter orange [6].

Recent studies have shown that consumption of energy drinks is a threat to public safety. Where the number of cases referred to emergency departments due to complications of consuming energy drinks doubled in the period between 2007-2011 in conjunction with the rise of the proportion of people over the age of 40 years, by (279%). Studies reported that young people are tend to mixing energy drinks with alcoholic beverages for various reasons, which means increasing the consumption of energy drinks among addicts and the ratio has reached about 25% of college students resort to mixing alcohol with energy drinks. In 2011, 42% of all emergency department visits related to energy drink included the collection of these beverages with alcohol or drugs (including illicit drugs, such as marijuana, as well as CNS stimulants such as Ritalin or Adderal) [7].

2. Material and Methods

2.1. Study Design

A cross sectional study conducted in Bukariayh town – Qassim region in the middle KSA, among sample of the population. The study aimed to identify the most common factors that enhance the consumption of energy drinks taking into account all demographic issues and other community variations.

2.2. Study Area

Bukariayh is a small city in the middle of Saudi Arabia; Bukariayh is situated at 26.15° North latitude, 43.66° East longitude and 659 meters' elevation above the sea level. Most of the inhabitants are working in the governmental sectors farms and business respectively.

2.3. Study Population

Study population consisted of all people living in Bukariayh town with different nationalities and gender focusing on those with age average between 18 up to 45 years old. The sample size was calculated by statistical equation and sample's populations were selected randomly. The total number of the sample size was (900) persons (male and female), from different nationalities.

2.4. Methods of Data Collection

Data collected through use of a questionnaire about factors related to consumption of energy drinks. It was a self-administered structured questionnaire written in Arabic and validated by public health specialists from faculty of public health and health informatics. The questionnaire consisted of (14) questions designed to collect the most relevant information about the attitude and practices regarding energy drinks that can enrich the requirements of this study.

2.5. Data and Statistical Analysis

The data was edited and reviewed during and after leaving the respondents. The researcher checked for all the parameters involved in data analysis. The data was analyzed through Statistical Software Package for Social Sciences (SPSS) version 22.

Inclusion criteria:

1. All people living in the region including citizens and other nationalities living as (residences).
2. All ages groups between 18 up to 45 years old.
3. All people in the sample size drinking at least two cans per day.

Exclusion criteria:

1. Aged under 18years.
2. Aged above 45 years.
3. People with a history of drug or alcohol abuse.
4. All people who reported that they never or rarely drinking energy drinks.

2.6. Ethical Consideration

The study obtained a written informed consent from the college of Public Health and Health informatics in Qassim University, and then a well-designed questionnaire was used to collect the data from the respondents. The questionnaire included socio-demographic characteristics such as age, gender and nationality. Other question were about sleeping habits, reasons for drinking energy drinks, the sources of their information about energy drinks and feeling after drinking the energy drinks. Information collected were divided according to the nationality, sex and age group taking into the consideration the other factors such as sleeping rates and nature of the work.

2.7. Statistical Analysis

Data was analyzed using SPSS version 22.

3. Results

Table (1). shows the Socio-demographic characteristics of the respondents in term of age, gender and nationality. The age average (24-29) years old of the respondents represented 143 (44.7%), male was dominant in drinking the energy drinks 246 (76.9%), in comparison with female (23.1%). Also the results in this table shows that most of the respondents were Saudi (238) with percentage of (73.9%) comparing with (26.1%) as non-Saudi.

Table (1). The Socio-demographic characteristics of the respondents regarding age, gender and nationality

Socio-demographic Characteristics		
Age group	Count	Per cent
18-23 Years	97	30.3%
24-29 Years	143	44.7%
30-35 Years	47	14.7%
36-41 Years	31	9.7%
42-45 Years	2	0.6%
Gender		
Male	246	76.9%
Female	74	23.1%
Nationality		
Saudi	238	73.9%
Non-Saudi	84	26.1. %

Table (2). shows the relationship between rate of drinking energy drinks and gender. The results show that (60.3%) of the male in our sample size were consuming energy drinks daily, with at least one can from different types of energy drinks, comparing with only (34.2%) of female were consuming energy drinks in the same quantity. Scores using the Chi-Square test indicated that there was a statistically significant association between gender and the rate of drinking energy drinks ($p = 0.034$).

Table (2). The relationship between drinking of energy drinks and gender

		Drinking rate		Total	
		daily	Not daily		
gender	male	Count	148	98	246
		% of Total	60.2%	39.8%	100%
	female	Count	35	39	74
		% of Total	34.2 %	52.8%	100%
Total		Count	183	137	320
		% of Total	57.2%	42.8%	100.0%
Sign		Chi-Square T	0.34		

Table (3). shows that (32.2%) of respondents who were drinking the energy drinks, sleeping less than 6 hours per day which is described as (up normal rate), and 41.6% sleeping (8) and less hours per day (moderate rate) while only 15.5% had normal rate of sleeping. That means sleeping rate decreased by consumption of energy drinks with percentage of (26.2%) from the normal rate, ($\eta = 0.189$), There was strong association with sleeping rate (p value = 002).

Table (3). The relationship between drinking of energy drinks and the rate of sleeping - a cross-sectional study of factors that enhancing consumption of energy drinks –KSA-2018

		Rate of sleeping	
Rate	Less than six hours (irregular rate)	Count	103
		% of Total	32.2%
	6-8 hours (moderate rate)	Count	133
		% of Total	41.6%
	more than 8h (normal rate)	Count	84
		% of Total	26.2%
Total		Count	320
		% of Total	100.0%
Chi-Square Tests		Value 12.347a	Df / Eta (η)
Sig	0.02	Rate Dependent	2 / 189
		Drinking Dependent	

Table (4). The relationship between gender and factors that enhancing consumption of energy drinks

			Reasons (factors)							Total
			Feeling of energy and active	To improve my sport performance	To improve my academic performance	To mix it with other drinks	To avoid sleeping	To increase my sexual desire and performance	Imitate celebrities or friends	
Gender	Male	Count	57	49	14	29	74	14	9	246
		%	23.2%	19.8%	5.7%	11.8%	30.1%	5.7%	3.7%	100%
	Female	Count	11	2	26	14	19	0	2	74
		%	14.9%	2.7%	35.1%	18.9%	25.7%	0.0%	2.7%	
Total		Count	68	51	40	43	93	14	11	320
		%	21.3%	16.0%	12.5%	13.4%	29.1%	4.3%	3.4%	100.0%

Table (4). shows the most common factors that enhance energy drinks among male and female, the results revealed that the most common factors among male was avoiding sleeping (30.1%) and (25.7%) for male and female respectively. Feeling of energy and active among male was (23.2%), comparing with (14.9) among female for the same factor without any significant differences. Other results show (11.8%) of male said they mix it with other drinks, while female seeking for improving academic performance (35.1%). Other important result was reflecting the opinion of the respondents about the role of energy drinks in increasing the sexual desire and sexual performance, the study revealed that this belief is common and predominant among male in our sample with percentage (5.7%), comparing with female only (0.0%).

4. Discussion

In the recent years, a lot of and different types of new energy drinks presented in Kingdom of Saudi Arabia. Its more common among college students [8]. The Council of Ministers issued a resolution banning to stop any commercial advertisement in the media because of the increase in the proportion of cases of heart disease among young and healthy people. Also the distribution of free energy drinks in public events for all age groups has also been banned and the sale of energy drinks in restaurants and cafeterias has been prohibited in governmental, educational and health institutions, government halls and private sports clubs. The Council's decision, committed to the owners of factories and importers of energy drinks, warned against the harmful effects of energy drinks.

The present study was an open label descriptive, comparative study done in Department of Public Health college of Public Health and Health Informatics in KSA in the time interval of November 2017 to July 2018.

In this study, we reviewed a large number of community population from different socio-demographic feature in term of age, gender and nationality. The age average (24-29) years old of the respondents represented 143 (44.7%), male was dominant in drinking the energy drinks 246 (76.9%), in comparison with female (23.1%). In addition, the results in this table shows that most of the respondents were Saudi (238) with percentage of (73.9%) comparing with (26.1%) as non-Saudi. [Table 2].

The study revealed that there was strong relationship between rate of drinking energy drinks and gender. The results show that (60.3%) of the male in our sample size were consuming energy drinks daily, with at least one can (per-day) from different types of energy drinks, comparing with only (34.2%) of female were consuming energy drinks in the same quantity. Scores using the Chi-Square test indicated that there was a statistically significant association between gender and the rate of drinking energy drinks ($p = 0.034$), [Table 2]. This result was comparable to results from

study conducted among (undergraduate and graduate college students) in the Central Atlantic region of the United States, which reported drinking greater than one energy drinks each month. Among college energy drink users, consuming energy drinks is particularly popular for insufficient sleep, [9], and also it comparable to results from study conducted in Canadian Centre on Substance Abuse, 2012 published in 2014 [10]. Many other studies confirmed that male are predominant in consumption of energy drinks comparing with female.

Regarding the sleeping rate, the study showed strong relationship with consumption of energy drinks, that (32.2%) of respondents who were drinking the energy drinks were sleeping less than (6) hours per day which is defined as (up normal rate), and (41.6%) sleeping (8) and less hours per day (moderate rate) while only 15.5% had normal rate of sleeping. That means sleeping rate decreased by consumption of energy drinks with percentage of (26.2%) from the normal rate, ($\eta = 0.189$), There was strong association with sleeping rate ($p \text{ value} = 0.002$), [Table 3].

In fact, it's confirmed (in all reviewed studies) that consumption of energy drinks or soda drinks (regardless the term used). Is affecting the sleeping rate. Reyner and Horne studied the effects of energy drinks on sleepiness showed that consuming these beverages reduced driving mistakes, such as lane swerving, and self-reported sleepiness when driving for extended periods [11]. The double-blind study concluded that those who consumed a drink containing the ingredients also found in energy drinks (caffeine, taurine, sucrose and glucose), as compared to those who were given a non-active placebo drink, reported less sleepiness and increased alertness while driving [12].

In a study of college students in the United States, involved completion of a questionnaire-based survey in (496) randomly selected college students. (67%) percent of the respondents consumed energy drinks to prevent falling asleep, (65%) percent to increase energy, and (54%) percent consumed the beverage to mix it with alcohol. [9].

The study revealed that the most common factors enhancing the consumption of energy drinks among male was avoiding sleeping (30.1%) and (25.7%) for male and female respectively. Feeling of energy and active among male was (23.2%), comparing with (14.9) among female for the same factor without any significant differences. Other results show (11.8%) of male said they mix it with other drinks, while female seeking for improving academic performance (35.1%). Other important result was reflecting the opinion of the respondents about the role of energy drinks in increasing the sexual desire and sexual performance, the study revealed that this belief is common and predominant among male in our sample with percentage (5.7%), comparing with female (0.0%), [Table 4].

These results are comparable with results revealed from recent study conducted in the same area by (Sulaiman O. Aljaloud Department of Exercise Physiology, King Saud University, Riyadh, Saudi Arabia) [13]. Although it was

focused only on college students but it has the same results regarding the ideas of the role of energy drinks it showed that (28.4%) believed that it will increase their energy and attention, (26%) of the sample reported that they drank energy drinks for energy (speed, strength and energy) however 23.4% reported developing and improving academic performance as a main reason for consumption of energy drinks. In a recent study among university students in a Caribbean country aimed at studying patterns of use and health effects of energy drinks, the most commonly reason was to achieve energy increases (50%), combat drowsiness (45%), and improved performance during sport (23%) [14].

In an additional study, it was found that the main reason for energy drink consumption among college students was to support studying for exams or completing a project (31.4%) [15]. Although it not in the main question prepared for this study, but some questions were given to our respondents regarding the test and mouth feel and their testimony confirmed that they may play essential role in influencing drinking energy drinks and a preference to choose a particular beverage. In this respect, these attributes could be used to influence the patterns of drinking beverages in order to improve liquid intake. This result is comparable to some studies to evaluate the sensory attributes of soft drinks and their influence on consumers' preferences [16-18].

5. Conclusions

Currently many people from different discipline are using energy drinks as a part of daily habits. Energy drinks well known and commonly used are Red Bull, Power Horse, Bison, Bugzy, Code Red, and others. In most cases they are used without a full knowledge about their components or evaluation of the potential benefits and risks associated with their use. Our study aimed to identify the most common factors that enhance the consumption of energy drinks taking into account all demographic issues and other community variations, but we need more studies in this filed to identify the main sources of these factors and why it is common among energy drinks believers. Other issues related to energy drink, like its effect in mode and mental health, should be conducted although some efforts were done and some evidences were observed, the majority of studies examined reported positive associations between energy drink consumption and symptoms of mental health problems [19]. Another study indicated that depressed children consume more caffeinated drinks than non-depressed children. Nonetheless while a strong association between depressive symptoms and caffeine consumption among children was found, further research should investigate whether or not this association is due to a cause and effect relationship [20]. Another suggests that the co-administration of caffeine and alcohol is a common and growing practice in Canada, especially among youth and young adults [21].

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