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Research Article

**THE RELATION BETWEEN ENERGY DRINKS AND
HYPERTENSION IN RIYADH CITY, SAUDI ARABIA: CROSS
SECTIONAL STUDY**

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Abstract:

Background: Energy drinks are caffeinated and sugar contained or sugar-free drinks that claim to enhance and boost cognitive and physical ability of the consumer, also, reduce the fatigue after athletic activity. Energy drink promotes the risk of overstimulation of the nervous system, seizure, myocardial arrhythmia, and even death. Energy drinks were found responsible for raises the mean arterial blood pressure level of the body and natriuresis. Acting as diuretic agent in a matter of fact, a single serving of caffeinated energy drink has proven to significantly raise systolic and diastolic blood pressures. **Objective:** this study to Investigate the Prevalence of hypertension in general population of Riyadh city, Explore the incidence of Toxicity/overdose of Energy Drinks and to determine the correlation of hypertension and prolonged consumption of Energy Drinks. **Methods:** The population of this study is 6,506,70 people, which are all the general population in Riyadh city in Saudi Arabia. The study was carried out in July – March 2017, in Riyadh province, Saudi Arabia. An electronic questionnaire was created by the research authors in the Arabic language. A pilot study was conducted to confirm the validity and reliability. **Results:** Out of 1555 participant (1128(72.5%) Females and 427(27.5%) Males), most of them were younger than 40 years old by 1180(75.8%) participant. Most respondents lived in Riyadh by 999 (64.2%), the rest of which 556 (35.8%) lived outside Riyadh. The age of respondents correlates significantly ($p < 0.001$) with Hypertension since 1054 (82.3%) who are less the age of 40 years and those 40 years and above 227 (17.7%) were non-hypertensive. On the other hand, individuals who are less than 40 years old and whom 40 years and above were hypertensive. **Conclusion:** Routine and good taste are the primary reasons for consuming energy drinks. Fewer levels of hypertension prevalence associated with energy drink users were found, but symptoms and signs of toxic levels are involved in 63.8% of consumers with a headache being the most prominent symptom as withdrawal effect.

Key words: Energy Drinks, Hypertension, Riyadh, Saudi Arabia.

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INTRODUCTION:

Energy drinks are caffeinated and sugar contained or sugar-free drinks that claim to enhance and boost cognitive and physical ability of the consumer, also, reduce the fatigue after athletic activity. [1] Energy drinks consist of 80 - 141 mg of caffeine per 237 ml (8 ounces), equal to 147.868 ml (5 ounces) of coffee or two 354 ml (12 ounces) cans of caffeinated soft drink. [2] In 2012 in the USA, energy drinks sales have reached 12.5 billion.[13] Energy drinks that contain caffeine are quite new in markets comparing to the traditional beverages like coffee and tea which have been used for yeras. [3].

Energy drink promotes the risk of overstimulation of the nervous system, seizure, myocardial arrhythmia, and even death. [4] Energy drinks were found responsible for raises the mean arterial blood pressure level of the body and natriuresis. Acting as diuretic agent [1] In a matter of fact, a single serving of caffeinated energy drink has proven to significantly raise systolic and diastolic blood pressures [5, 6, 7]. A Study has shown a high amount of caffeine intake reduces insulin sensitivity. [1] It may also cause electrolytes imbalance. In general, Chronic kidney disease is associated with the consumption of sugar-sweetened drinks, whether carbonated or not, for more than four servings a week. [8]

Visits to emergency departments related to caffeine-containing energy drink consumption between 2005-2011 have increased around 14-fold. Most of these visits are reported as consequences that include exclusively caffeine-containing energy drinks without the involvement of dietary supplements, illegal or legal drugs, or alcohol The majority of these were reported as adverse events involving only a caffeine-containing energy drink, without evidence of involvement of alcohol, legal or illegal drugs, or dietary supplements. [9]

Energy drinks are popular among young adults and teenagers, a study was carried out in Poland showed out of 2629 respondents, Energy drinks were consumed by 1756 students (67%). Males more than females ($p < 0.01$). [10] Another cross-sectional pilot study was conducted on university students and eight schools in Lebanon. The participants were 956 students, the age of first consumption of energy drinks are 15 ± 3 years, Most (51.1%) participants consumed drinks less than one time per month. [11]

A cross-sectional study of secondary school students which considered as national representative samples revealed that the association between substance use and energy drinks consumption was considerably

stronger than the one between substance use and diet or regular soft drinks. [12]

Another study investigating the knowledge of medical students regarding the Energy Drinks and its pattern of consumption, the study involved 866 participants, the majority are females 70.9%, Energy drinks users were 42.89%, Only 29.3% of them knows the definition of Energy drinks. [13] A review study conducted on Gulf Cooperation Council states about energy drinks revealed that most of the individuals were approximately at 16 years of age when they started consuming energy drinks. [14]. Smokers were more consuming (59.6%) than non-smokers (59.6%, 27.1% respectively) ($p < 0.001$). [15] Most of the students thought the energy drinks are popular because of its usefulness in decreasing sleep hours ($p < 0.05$). [13] Another study suggests that the energy-seeking and taste were the most strong key-drivers, in addition to the marketing and branding which have a very big influence on its popularity among young people.[16] Non-users of energy drinks indicate there are reasons that prevent them from using energy drinks, one of them is the side effects (47.8%). Regarding the side effects, the users of energy drinks report fatigue 31.7% and weight gain 29.4%. [13]

Extensive consumption of caffeine could cause serious cardiovascular complications. acute ingestion of caffeine can increase systolic blood pressure. The mechanism is intervening with adenosine A1 and A2A receptors. Toxicity levels of caffeine in the blood are easy to achieve due to the high amount of caffeine quantity in the energy drinks. Balanced chronic consumption of energy drinks (300 mg caffeine per day) was not correlated with cardiovascular complications. The Large meta-analysis included 140,220 patients showed an important correlation between coffee intake and congestive heart failure. [17]

Our objectives were to Investigate the Prevalence of hypertension in general population of Riyadh city, Explore the incidence of Toxicity/overdose of Energy Drinks and to determine the correlation of hypertension and prolonged consumption of Energy Drinks.

METHODS:

The population of this study is 6,506,700 [1] person, which are all the general population in Riyadh city in Saudi Arabia. The study was carried out in July – March 2017, in Riyadh province, Saudi Arabia. The study received approval from the Office of Research Ethics at the Imam Mohammed Ibn Saud Islamic

University, College of Medicine.

An electronic questionnaire was created by the research authors in the Arabic language. A pilot study was conducted to confirm the validity and reliability. The questionnaire constructed to include two sections important to our objective, the first part assessed the socio-demographic characteristics of the respondent's background information (i.e. age, gender, and region) and the second part assessed energy drink consumption and hypertension (i.e. diagnosed with

hypertension, the diet, the reason of consuming energy drinks, time of consuming, and how many time do you consume energy drinks).

The sampling method is Convenient sampling; our targeted population are general population age 18 and above in Riyadh city in Saudi Arabia. Statistical analysis was administered using the statistical package for social sciences (SPSS). Chi-square test will be used as an analytical tool.

RESULTS:

Table 1. demographic characteristics of the participants.

| | | Count | Column N % |
|---------------------|--------|-------|------------|
| Age group | <40 | 1180 | 75.8% |
| | >=40 | 375 | 24.2% |
| Gender | Female | 1128 | 72.5% |
| | Male | 427 | 27.5% |
| Do u Live in Riyadh | No | 556 | 35.8% |
| | Yes | 999 | 64.2% |

Out of 1555 participant 1128 (72.5%) are Females and 427 (27.5%) are Males, most of them were younger than 40 years old by 1180(75.8%) participant. Most respondents lived in Riyadh by 999 (64.2%), the rest of which 556 (35.8%) lived outside Riyadh.

1285(82.6%) from the participant were not diagnosed or they do not know if they had Hypertension or not, While the other 270 (17.4%) have Hypertension. Most of them were diagnosed less than one year by 168 (10.8%) the others from one to more than five years are 102 (6.6%). Participant who follow diet modifications like: lowering consumption of fat, salt, carb or sugar intake (n= 835) are slightly less than those who do not follow any specific diet (n= 987).

Over 1555 only 1030 (66.2%) participants drink energy drinks and mostly at home by 668 (43%) and their free time of which 456 (29.3%), other times like when studying, at work, or while driving isn't that significant. More than half of the participant consumes energy drinks because it tastes good by 843 (55.5%), then daily routine 645 (42.5%) and fresh and alert by 611 (40.3%), the other variables like relieving headache, good for work, etc. are much more less. More than half of the consumers drink more than seven small Arabic coffee cups by 663 (48.8%), quarters prefer large coffee from star bucks by 329 (24.2%), more than three bottles of red bull or more than three cups of dunkin donuts comes in last.

Table 2. Association between demographic data and hypertension.

| | | Hypertension | | | | P value |
|---------------------|----------------------|--------------|-------|-------|-------|---------|
| | | No HTN | | HTN | | |
| | | Count | % | Count | % | |
| Age | <40 | 1056 | 82.3% | 120 | 44.8% | <0.001 |
| | >=40 | 227 | 17.7% | 148 | 55.2% | |
| Gender | Female | 962 | 74.9% | 166 | 61.5% | <0.001 |
| | Male | 323 | 25.1% | 104 | 38.5% | |
| Do u Live in Riyadh | No | 486 | 37.8% | 70 | 25.9% | <0.001 |
| | Yes | 799 | 62.2% | 200 | 74.1% | |
| frequency of ED use | Daily | 836 | 66.4% | 179 | 67.0% | 0.04 |
| | 1 to 3 times weekly | 337 | 26.8% | 77 | 28.8% | |
| | 1 to 3 times monthly | 56 | 4.4% | 9 | 3.4% | |
| | Depends or rarely | 30 | 2.4% | 2 | 0.7% | |

The age of respondents correlates significantly ($p < 0.001$) with Hypertension since 1054 (82.3%) who are less the age of 40 years and those 40 years and above 227 (17.7%) were non-hypertensive. On the other hand, individuals who are less than 40 years old and whom 40 years and above were hypertensive. Similarly, gender and area of residency as the data are shown in table 2 have significant relation with hypertension ($p < 0.001$).

A significant relation was found ($p < 0.001$). Participants with daily energy drinks consumption 176 (17.5%) were more likely to get diarrhea and constipation than non-daily 55 (10.8%). Correspondingly as shown in table 5, abdominal pain, heartburn, nausea and vomiting are strongly correlated with frequency usage of energy drink. Frequent urination is the most common symptom reported among all the respondents 253 (25.1%) and 101 (19.8%) in daily and non-daily consumers respectively ($p = 0.02$).

As the hypothesized result of chi-square analysis indicates that significantly greater proportion of participants experienced symptoms after stop energy drink were daily users than non-daily. Headache is the commonest symptoms our applicants experienced 304 (60.4%) followed by feeling sleepy 196 (39%) with significance ($p < 0.001$).

DISCUSSION:

The result shows high usage of energy drinks among residents of Riyadh providence in which 65.3% of them consume it on a daily basis. However, 63.8% showed signs and symptoms of a toxic level being frequent urination is the most symptom affected by 25.1% of energy drinks consumers.

For this study, taste has been the primary reason for consuming energy drinks 843 (55.5%), this comes with an agreement from the evidence review study [16]. It also patterned by gender where 1128, 72.5% of females consume energy drinks which contrast with the evidence review study [16]. This could be explained by ratio of females' participants versus males 3:1.

Use of ED and HTN

consumption of energy drinks raises blood pressure because of caffeine content, in a study included ED users less than 40 years old, who consume 500 – 700 mg caffeine per day, half of the participants were found having mild hypertension. [19] Other studies investigate the association between the chronic usage of ED and hypertension, no association was determined in males and females.

Use of ED and reason of usage

In our study, one of the variables were the reason of consumption of EDs, most of the participants report taste was the reason using EDs. In other study the same finding was shown, taste was the most reported reason, followed by price and effects of EDs. [10]

Conclusion:

Routine and good taste are the primary reasons for consuming energy drinks. Fewer levels of hypertension prevalence associated with energy drink users were found, but symptoms and signs of toxic levels are involved in 63.8% of consumers with a headache being the most prominent symptom as withdrawal effect. Education of energy drink users is important especially for those who have a history of hypertension and correction of wrong the perception is a must to prevent serious side effects and to raise the public awareness toward energy drinks.

Disclosure:

The authors report no conflicts of interest in this study.

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