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RESEARCH TITLE

EVALUATION OF CAFFEINE IN DIFFERENT BEVERAGES TRADED IN LIBYAN MARKET BY ULTRAVIOLET SPECTROSCOPY UV

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Abstract

This study was carried out to determine the level of caffeine in eight brands of carbonated soft and energy drinks available in local market in Tripoli, Libya. The targeted drinks included two locally produced types (PEPSI® and COLA®) and six imported types (BAISON® energy drink, REDBULL® energy drink, X MAX®, and REAL MADR® and POWER HOURSE® energy drink). Using the U.V Spectrophotometer method, quantitative analysis of caffeine was performed utilizing methanol/chloroform as the extraction solvent. The U.V Spectrophotometer results showed that PEPSI soft drink has the lowest caffeine level (125ppm), while the X-MAX energy drink showed the highest caffeine content (425 ppm). The caffeine content in locally produced soft drinks (PEPSI® and COLA®) was low and within the limit allowed by the FDA. While most of the tested energy drinks such as RED BULL®, X-MAX®, and REAL MADRID® exceeded the established limit.

Key Words: Chemical treatment, drilling Mud, heavy metals, Portland Cement.

INTRODUCTION

Energy drinks (EDs) are non-alcoholic, sugary drinks that contain varying amounts of caffeine, taurine (an amino acid), glucuronolactone, herbal extracts, minerals, and vitamins which intended to increase the physical and mental endurance (Reissig et al., 2009). The majority of people who consume EDs engage in strenuous physical activity, such as athletes and students due to their perception that the EDs act as mental and physical stimulants and enhance their performance ability (Barbara et al., 2016). Due to the widespread and long-term consumption of beverages containing caffeine naturally, such as coffee and tea, the regulation of beverages containing added caffeine has been complicated (Johnson et al., 2011) The maximum daily recommended intake of caffeine ranges from 2.5 mg/kg/day to 6 mg/kg/day for children, 100 mg/day for adolescents, and 400 mg/day for adults (Heckman et al.,2010). Caffeine tolerance varies between individuals, with the majority of people developing toxic symptoms at doses of 200 mg (Lesson et al.,1988). Caffeine is a natural stimulant for the central nervous system, and has effects in reducing drowsiness and restoring alertness. (Legorette al 1997).However numerous studies demonstrated that caffeine, (Spiller, 1998). Have some passive health effects such as increasing heartbeat rate, dilating blood vessels and elevating levels of free fatty acids and glucose in plasma. It has been demonstrated that 1 g of caffeine leads to insomnia, nervousness, nausea, ear ringing, flashing of light derillum and tremulosness. In cases of overdosing and in combination with alcohol, narcotics and some other drugs, these compounds produce a toxic effect, sometimes with lethal outcome (Gerald et al., 2014). Where excessive caffeine consumption leads to various health problems, such as rhabdomyolysis, which directly affects urine production (Chiang et al., 2013) and causes dehydration. In addition, ED can cause hypokalemia as well as high creatinine kinase levels and kidney failure (Armstrong et al., 2013)and tooth erosion problems due to acidic pH (Li. H et al., 2012).According to Voss and Lavin (Vos. M et al., 2013) The association of sugar-sweetened beverages with increased daily consumption leads to the risk of diabetes, cardiovascular disease, overweight and obesity, and also reduces the chance of pregnancy (erectile dysfunction).For these reasons of number of countries have enacted regulations governing the labeling, distribution, and sale of energy drinks containing significant amounts of caffeine (Johnson et al., 2011). As a result countries including Denemark, Turkey and Uruguay have taken strict measures to completely ban energy products. Sweden has also banned the sale of energy drinks, while Australia banned energy drinks containing more than 320 PPM of caffeine(India's Food Safety and Standards Authority,2010).

MATERIALS AND METHODS

Estimation of Sample Size for Energy Drinks

Purposeful sampling was used to collect eight energy drink samples, the tow samples were brands produced in Libya PEPSI® and COLA®, and the other Six were brands imported from outside the country. (BAISON® REDBULL®, X MAX®,REALMADRED® and POWER HOURSE®). Analyses was performed by UV spectrophotometer janway6100

Data Collection

The samples were purchased from grocery stores. The samples were placed in a cool box with icepacks and transported to the Food Science Lab where they were stored at a temperature of 4-10°C until analysis.

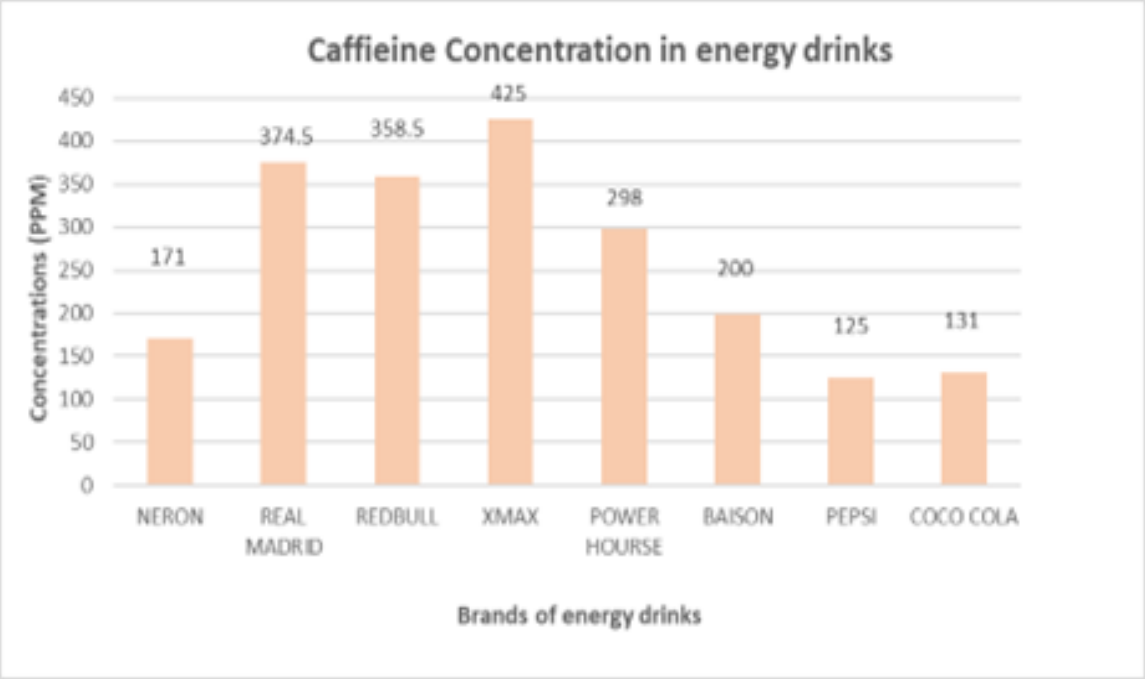
Sample extraction and Caffeine Measurement:

ED drink sample was placed in a separating funnel, 1 ml of 20% (w/v) methanol and 5 ml of chloroform were added, and the mixture was shaken for five minutes (Maidon et al., 2012)

The absorbance containing caffeine was measured at 271 nm using a UV Vis spectrophotometer (X-ma 500, England. standard stock solution (1000 ppm)was prepared by dissolving 0.1 g of pure caffeine in 100 ml of chloroform. We prepared serial dilutions (5,10,15,20,25 ppm), measured absorbance, determined a linear regression equation, which was then used to quantify the caffeine. The final caffeine content of the tested beverage was then calculated using the concentration of the extracted sample solution.

RESULTS AND DISCUSSION

The eight different brands of ED beverages in duplicates brands that were produced in Libya (PEPSI energy drink, COlA energy drink,) and the six that were The eight different brands of ED beverages in duplicates brands that were produced in Libya (PEPSI energy drink, COlA energy drink,) and the six that were imported from abroad (Baison energy drink, REDBULL energy drink, X MAX ,and REAL MADR and POWER HOURSE energy drink) have shown variable concentration . Of the samples tested, the sample of X MAX energy drink had the highest caffeine content at 425 ppm.



The study results showed that X MAX contains the highest concentration of caffeine (425 ppm), which exceeds the recommended limit in many countries. In comparison, PEPSI® and COLA® drinks contain lower levels of caffeine within the safe limits permitted by the US Food and Drug Administration (FDA). This difference highlights the difference between local and imported drinks. Imported energy drinks, such as X MAX and RED BULL®, target young consumers seeking a boost of energy, but excessive consumption of these drinks can lead to significant excess of the recommended daily dose of caffeine, posing potential health risks. Compared to previous studies and a recent study published by the University of Tripoli (Al-Saadawi et al., 2016) which focused on soft drinks and coffee also traded in the Libyan market, regardless of the type of producing companies, high concentrations of caffeine were also found in some samples. This gives an indication of the ingredients and concentrations of caffeine added for commercial purposes. In this context, the FDA recommends a maximum daily caffeine intake of 400 mg for adults. This limit is based on individual differences in caffeine tolerance, but exceeding it can lead to toxic symptoms such as headaches, insomnia, and extreme nervousness. This makes us urgently need to adopt regulations similar to those in countries such as Sweden and Australia, where strict limits on the caffeine content of energy drinks have been imposed. Mandatory health warnings could be imposed on the labels of

drinks with high caffeine levels to raise consumer awareness. And to reinforce it with healthier and more active alternatives such as exercise and proper nutrition.

CONCLUSION

The results of the tests conducted in this study showed that the majority of energy drinks examined exceeded the allowable limits according to Libyan standards. This indicates the potential presence of elevated caffeine levels that may surpass recommended health limits, raising concerns about the possible health effects of these beverages

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