



Case Report

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Adverse Effects of Energy Drinks, a Challenge for Medicine: A Case Report

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Abstract

In Mexico, an estimate of the monthly average consumption of these drinks was 36,240,000 liters [1]. The use of these products is to increase energy levels during physical activity or exam periods to avoid sleep. Despite the increase in its use, there is ignorance in its consumers about its level of safety in its consumption [2]. Energy drinks (ED) appeared on the market as a mixture of carbohydrates, vitamins, and caffeine. Later, alcohol blends were made for cocktails, so their popularity increased. The high consumption of ED is due to the mental stimulating effect by the high levels of caffeine, taurine and glucuronolactone [3].

The case of a patient is reported who presents jaundice and an abnormal liver function with symptoms of a disease sui generis, after two weeks of consuming ED. He was not diagnosed since the symptoms still represent a challenge for medicine. When the patient stop pending the use consumption of ED, the patient took 30 days passed before for his liver function tests and his clinical picture were normalized.

Keywords: Energy drinks; Teenagers; Cardiac arrhythmias; Adverse effects; Caffeine; Taurine

Implication and Contribution

One patient presents with jaundice and abnormal liver function tests with symptoms of a disease sui generis, after 2two weeks of consuming energy drinks. He was not diagnosed since the symptoms still represent a challenge for medicine. However, when stopping the consumption of these drinks, the patient took 30 days passed before his for-liver function tests and his clinical picture to were normalize.

Case Report

A 19-year-old, single undergraduate male patient, with domicile in the state of Hidalgo, Mexico, came to the clinic for the first time

with a seven-day clinical picture including: with seven days of evolution: tiredness, dizziness, vertigo, chest tightness, headache, low back pain, heartburn, dysuria, tinnitus, paresthesia's in upper and lower limbs, and generalized excessive diaphoresis.

In the family history, the patient reported myopia, astigmatism, and a molar extraction one a year ago, denied neurological and allergic problems. He presented suicidal ideas his paternal grandfather had diabetes, and his maternal grandfather had a pacemaker. He denied the use of tobacco but does drank alcohol occasionally drink alcohol. In addition, he says that during the last two weeks he has took consumed 500 mL/day of ED with the aim



of increasing his physical activity, reducing fatigue and tiredness. Different exams were carried out with the presumed diagnosis of icteric syndrome in study: hematic biometry, blood chemistry, liver function tests, urine general study and abdominal ultrasound. In hematic biometry, an increase in erythrocytes was observed ($6.26 \times 10^6/\text{mm}^3$); hemoglobin (18.3 g/dL) and hematocrit (55.6%) were above normal level. Blood chemistry analysis showed an increase in total bilirubin (1.51mg/dL), direct bilirubin (0.27 mg/dL); and

Indirect bilirubin (1.24 mg/dL) (Table 1). The urine general test was normal, and the result of diagnostic tests for hepatitis was negative. In liver function tests, they were performed on days 0 and 30, without significant alteration (Table 2). Hepatic gland without focal or diffuse lesions, gallbladder, spleen, and kidneys without data that suggested any pathology was reported in the abdominal USG (Figure 1).



Figure 1: USG images of liver and bile ducts performed on day zero.

Table 1: Results of Hematic Biometry and Blood Chemistry.

Hematic biometry				
	Day 0	Day 15	Day 30	Reference values
Erythrocytes ($\times 10^6/\text{mm}^3$)	6.26	6.04	6.01	4.7-6.1
Hemoglobin (g/dL)	18.3	17.7	17.7	13.2-17.2
Hematocrit (%)	55.6	53.6	53.6	42-52
Total leucocytes (/uL)	5800	4200	6600	450-11000
Blood chemistry				
Serum glucose (mg/dL)	79	78	85	70-100
Total serum cholesterol (mg/dL)	138	141	142	<200
Serum triglycerides (mg/dL)	176	136	118	<150
Total bilirubin in serum (mg/dL)	1.51	1.68	1.18	0.3-1.0
Direct bilirubin serum (mg/dL)	0.27	0.29	0.21	0.0-0.18
Indirect bilirubin serum (mg/dL)	1.24	1.39	0.97	0.0-1.0

Source: Laboratories, performed on days 0,15 and 30.

Table 2: Results of liver function tests.

	Day 0	Day 15	Reference values
Lactic dehydrogenase (DHL) in serum (U/L)	146	14	100-271
Alkaline phosphatase (ALP) in serum (U/L)	108	100	30-120
Gamma-glutamyl transpeptidase (GGT) in serum (U/L)	38	29	9-64
Serum amylase (U/L)	62	64	29-103
Serum lipase (U/L)	19	16	11-82
Total serum proteins (g/dL)	7.1	7.39	6.4-8.9

Serum albumin (g/dL)	4.79	4.97	3.5-5.7
Globulins in serum (g/dL)	2.31	2.42	2.0-3.5
Albumin / globulin ratio	2.07	2.05	>1.0
Serum sodium (mmol/L)	138.1	137.7	136-146
Serum potassium (mmol/L)	4.3	4.5	3.5-5.1
Serum chlorine (mmol/L)	103.9	104.2	101-109
Serum calcium(mg/dL)	9.8	9.6	8.6-10.3
Serum phosphorus (mg/dL)	4	3.3	2.5-5.0
Serum magnesium (mg/dL)	1.9		1.9-2.7
Serum osmolarity (mOsm/Kg)	285		275-295
Serum iron (ug/dL)	78		50-212
Unsaturated Iron Fixing Capacity (ug/dL)	359		155-355
Total Iron Fixing Capacity (ug/dL)	437		250 - 350

Source: Laboratories, performed on days 0, 15 and 30.

The patient was instructed to stop drink the DE to start rehydration, accompanied by antihypertensive and antiarrhythmic treatment for one week, with an open appointment to the emergency department and appointment at 15 and 30 days. In addition, due to the history of suicidal thoughts, he was referred to a consultation with psychology.

A trend towards improvement of erythrocytes, hemoglobin and hematocrit was reported in Hematic Biometry of subsequent consultation. Blood chemistry analysis showed an increase in total, direct and indirect bilirubin (Table 1). After of the analysis of the signs and symptoms presented by the patient and the results of cabinet studies, the diagnosis of Icteric Syndrome secondary to probable exposure of ED was managed.

For the psychological evaluation of the effects of ED on mental health, the acceptance of informed consent and the International Neuropsychiatric Interview (INI) was requested [4]. The main Axis I psychiatric disorders of DSM-IV and ICD-10 (which is a structured instrument of short duration and exploration) and Beck's Anxiety and Depression Inventories were applied [5] in order to confirm data obtained by INI. The patient had an inadequate level of introspection, anxious and depressive symptoms without previous history, a manic episode with a tendency to risk behaviors such as driving at high speed, restlessness, inattention and high level of alertness.

Thirty days after the medical consultation, a major depressive episode, melancholic symptoms, mild suicide risk, maintenance of a manic episode, panic disorder and current post-traumatic stress, and generalized anxiety were detected. In both evaluations, psychotic symptoms were ruled out. He was referred to the mental health service for psychiatric evaluation, without knowing the current results of his treatment.

Discussion

EDs are consumed mainly by adolescents and young adults. However, many of them do not know the characteristics, ingredients, safety level in their consumption, health effects, especially if DE are consumed in excess or mixed with other drugs as alcohol [2,6]. A bottle of these drinks is equivalent to three cups of coffee and contains between five and seven tablespoons of sugar [7]. Excessive consumption of DE can lead to an overdose of caffeine with detrimental effects in the health as headache, tachycardia, dry mouth, nausea, vomiting, diarrhea, stress, physical exhaustion, impaired coordination, disorientation, insomnia, hallucinations, anxiety, and depression, delirium, excitement tremors, and seizures [8]. As a result of multiple activities and limited time to rest. Most of these physiological and neurological changes were reported by the case study. At a cardiovascular and hepatic level, increased blood pressure, tachyarrhythmias and dyslipidemias have been reported in people who consume them regularly. Additionally, heart attacks, irreversible neurological injury, liver effects, and caffeine dependence have been documented. Liver dysfunction may be due to the fact that taurine is conjugated to secondary bile acids [9,10] reported anxiety, restlessness, irritability, difficulty concentrating, as well as trouble sleeping after the ingestion of 200 to 250 milliliters of ED daily during those 4 months in a psychiatric case report [10]. Even with the consumption of a higher amount (14 bottles of ED containing 250 mL) for two days, the risk of a suicide attempts a exists suicide [11]. There are no studies demonstrating the beneficial effects of ED, but there is sufficient evidence of the adverse effects of some of its more common components. Information should be provided to the general population on the indiscriminate use of this type of beverages, and further studies on the effects of short, medium and long-term consumption are necessary to determine with certainty the safety of ED. Therefore,

the risk of cardiovascular, neurological, and liver damages, if it is, if ED are consumed without responsibility, are emphasized.

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