

Heart Failure Caused by Energy Drinks: A Case Report and Literature Review

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Abstract

This case report details a 34-year-old male patient, previously healthy, who presented with penile swelling, reduced tolerance for physical activity and occasional shortness of breath. Over one month, he experienced a 14 kg weight gain without a change in appetite. Physical examination revealed swelling in the lower limbs and scrotum. Laboratory results showed substantially elevated NT-proBNP (N-terminal pro-B-type natriuretic peptide), liver enzymes and high D-Dimer levels. Imaging indicated an enlarged cardiac profile suggesting pericardial effusion and a potentially fatty liver. His medical history included a significant intake of energy drinks, averaging four cans daily. Three months later, the patient returned with worsening heart failure symptoms, though echocardiography showed improved left ventricular ejection fraction (from 15% to 25%) despite persistent diastolic dysfunction. This case highlights the potential cardiotoxicity of excessive energy drink consumption, consistent with studies linking these beverages to cardiovascular issues, including sudden cardiac death. Research underline the impact of caffeine and other common ingredients in energy drinks on heart rhythm and function. With energy drink use rising among young adults, this case illustrates the need for increased awareness of the severe health risks they can pose. The patient was discharged in stable condition with recommendations for further cardiac assessment, including coronary angiography and potential evaluation for an Implantable Cardioverter-Defibrillator (ICD). This report advocates for increased clinical vigilance regarding energy drink consumption and associated cardiovascular risks.

Keywords: Heart failure; Energy drinks; Heart; Implantable Cardioverter-Defibrillator (ICD); Cardiovascular

Introduction

This study aims to present a case report and literature review on heart failure linked to energy drink consumption.

This case report details a 34-year-old male patient, previously healthy, who presented with penile swelling, reduced tolerance for physical activity and occasional shortness of breath. Over one month, he experienced a 14 kg weight gain without a change in appetite. Physical examination revealed swelling in the lower limbs and scrotum. Laboratory results showed substantially elevated NT-proBNP (N-terminal pro-B-type natriuretic peptide), liver enzymes and high D-dimer levels. Imaging indicated an enlarged cardiac profile suggesting pericardial effusion and a potentially fatty liver. His medical history included a significant intake of energy drinks, averaging four cans daily. Three months later, the patient returned with worsening heart failure symptoms, though echocardiography showed improved left ventricular ejection fraction (from 15% to 25%) despite persistent diastolic dysfunction.

A PubMed search was conducted using keywords "energy drinks" and "heart".

Case presentation

A 34-year-old male with no prior medical issues was admitted due to penile swelling, diminished exercise tolerance and occasional resting shortness of breath. He reported additional concerning symptoms, such as shortness of breath, significant fatigue and weight gain of 14 kg over the past month without

a change in appetite. Physical examination revealed lower extremity and scrotal edema. Laboratory findings included:

- NT-proBNP (The natriuretic peptides): 5860 pg/ml (normal <125)
- ALT (Alanine aminotransferase): 843 U/l (normal <50)
- AST (Aspartate aminotransferase): 644 U/l (normal <50)
- CRP (C-Reactive protein): 23 mg/l (normal <5)
- WBC (White blood cell): $15.74 \times 10^3/\mu\text{L}$ (normal 4,000-10,000)
- D-Dimer: 3934 ng/ml (normal <500)
- Na: 132 mmol/L (normal 136-146)

A chest X-ray indicated a significantly enlarged heart silhouette Cardiothoracic Ratio (CTR) 67%, resembling a bottle shape, which suggested pericardial effusion. An abdominal ultrasound showed a mildly enlarged liver with increased echogenicity, suggesting fatty liver or acute liver injury. Additional findings included a thickened gallbladder wall and free fluid up to 11 mm in the right iliac fossa.

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Results

The patient was admitted to the cardiology department. During hospitalization, he disclosed his excessive energy drink consumption, averaging four cans daily over recent weeks. Three months later, he was readmitted with worsening heart failure, including fatigue, cough and shortness of breath while lying down. Physical exam showed lung congestion but no peripheral edema. An echocardiogram showed improvement in left ventricular ejection fraction from 15% to 25%, with grade III diastolic dysfunction and restrictive mitral inflow pattern. After treatment, his symptoms resolved and he was discharged in stable condition with instructions for further cardiac assessment, including coronary angiography and consideration for ICD placement.

Discussion

The literature reports various cases linking energy drink intake with heart failure. In 2009, media outlets noted that energy drink consumption alongside alcohol and exercise could lead to sudden cardiac death. Winkuld et al. conducted a study examining ECG changes and heart rate variability after consuming an energy drink mixed with alcohol and exercise [1]. Ten healthy volunteers performed maximum exercise after either drinking 0.75 liters of an energy drink with alcohol, the energy drink alone, or no drink. ECG (Electrocardiogram) showed slower heart rate recovery after consuming the energy drink with alcohol, which reduced cardiac autonomic control. Although no arrhythmias developed, those predisposed to arrhythmias might be at increased risk in similar situations.

Another report involved a 24-year-old who, after consuming 8 cans-10 cans of energy drinks daily, presented with an ejection fraction of 25% and dilated left ventricular dimensions. The authors linked excessive caffeine intake to cardiac events, possibly due to a synergistic effect with other energy drink components [2].

Cerit in 2016 reviewed research demonstrating that energy drinks may decrease heart rate and alter the ST-T segment in young adults [3]. Hajsadeghi et al., confirmed these findings in a quasi-experimental study, where energy drink intake was associated with decreased heart rate and ST-T segment changes [4].

Ellermann et al., showed that caffeine and taurine, key ingredients in energy drinks, shorten cardiac repolarization, potentially leading to ventricular arrhythmias. This animal study concluded that these compounds may increase arrhythmias, particularly at high doses [5].

Further studies on animals reported that long-term consumption of Red Bull and alcohol affected heart structure, biochemical properties and cholesterol levels. Researchers recommend athletes and active individuals avoid combining Red Bull with alcohol [6].

Oberhoffer et al., found that energy drinks increase systolic and diastolic blood pressure in children and teenagers [7], while Madrillas et al., observed more supraventricular ectopic beats in minors who consumed energy drinks, suggesting adverse rhythmological effects [8].

In a 2018 study, Nowak et al., observed significant increases in diastolic blood pressure and blood glucose following acute energy drink consumption, with reported discomfort [9]. Their 2019 follow-up study found that noni juice may reduce blood pressure and glucose, contrasting with the effects of energy drinks [10].

Conclusion

This case highlights the potential cardiotoxicity of excessive energy drink consumption, consistent with studies linking these beverages to cardiovascular issues, including sudden cardiac death. Research underscores the impact of caffeine and other common ingredients in energy drinks on heart rhythm and function. With energy drink use rising among young adults, this case illustrates the need for increased awareness of the severe health risks they can pose. The patient was discharged in stable condition with recommendations for further cardiac assessment, including coronary angiography and potential evaluation for an Implantable Cardioverter-Defibrillator (ICD). This report advocates for increased clinical vigilance regarding energy drink consumption and associated cardiovascular risks.

Energy drinks are especially popular among young adults, yet excessive intake can pose serious health risks. Standard energy drinks contain 80 mg of caffeine, taurine, glucose, vitamins and other additives. Overconsumption can lead to the accumulation and interaction of these components, posing cardiovascular risks.

In conclusion, while widely consumed, energy drinks carry significant health risks, particularly for young people and individuals with underlying conditions, due to the cumulative effects of their ingredients.

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