



Letter to the Editor

## Energy Drinks and Heart Damage in Young People

Dear Editor,

We have read with great interest the case report “Energy Drink-Associated Cardiomyopathy after Excessive Consumption: A Case Report” by Uyanik et al<sup>1</sup> and found it significant concerning cardiac damage induced by caffeinated beverage consumption among young people. This case report describes a 24-year-old man presenting a left ventricular ejection fraction of 25% with global left ventricular hypokinesia and dilated left ventricular dimensions. He had consumed 8 to 10 cans of EDs per day (3.5–4 Lit/d) in the 2 weeks leading to the hospital admission. The authors concluded that their case report supported a possible link between caffeinated EDs and cardiovascular events.

We find this case report of great interest and wish to contribute to the discussion.

The growing global appeal of ED consumption underscores the potential cardiovascular adverse events induced by binge drinking and its association with alcohol.<sup>2-4</sup> It has yet to be determined whether the harmful effects of EDs on the heart are due to the excess of caffeine or to the synergy between the actions of caffeine and other substances present in EDs. Most EDs contain various substances with an exciting effect on cardiomyocytes, promoting a pro-arrhythmic action or direct myocardial damage. Guarana, taurine, and ginseng are habitual components of the most common EDs.<sup>5,6</sup>

The perplexing aspect is a false notion that EDs are harmless drinks. Such a belief leads to binge consumption, especially on social occasions.<sup>2</sup> A further confounding factor is the perception that EDs are comparable to soft and sports drinks.<sup>5</sup> However, soft and sports drinks have a very low dosage of caffeine compared with EDs. Data on the harmful effects of coffee on the heart and arrhythmia development indicate that the dosage is a significant factor, with EDs containing high doses of caffeine and other exciting substances.<sup>7,8</sup>

In a previous paper, we reported the development of arrhythmias in young subjects after introducing a high dosage of EDs, supporting the hypothesis of tachycardia-induced cardiomyopathy.<sup>3</sup> Nonetheless, the paucity of knowledge regarding the effects of EDs does not allow us to rule out direct myocardial damage.

During the recent pandemic, the dietary changes affecting young people have also involved ED use as recreational

drinks, with an increase in consumption by young students, especially males.<sup>9</sup>

A further dangerous aspect is the association with alcohol. Caffeine intake may reduce the perception of the effects induced by alcohol, such that drinkers may not perceive the symptoms of alcohol intoxication. Therefore, excessive ED consumption associated with alcohol can result in a higher likelihood of binge drinking, leading to alcohol dependence.<sup>10</sup>

Adequate preventive measures need to appreciate the reasons for the increased ED consumption among adolescents. Educational interventions should be focused on developing knowledge and skills related to EDs and their health effects on adolescents.

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## Energy Drinks and Heart damage in Young People: A Reply

Dear Editor,

We wish to thank you for your meticulous perusal of our article.<sup>1</sup> In addition to your valuable comments, I would like to draw your attention to the following points.

There are many compelling points about the contribution of energy drinks to cardiomyopathy. Firstly, the safety problem associated with energy drinks is that poor-quality brands add substances not specified in the content. During inspections, sildenafil, a prohibited substance, was found in the component of these drinks.<sup>2</sup> There are probably other

components as yet undetected. Many victims may suffer from heart disease due to these and similar substances that should not be in the formula. Distributing giveaways to businesses as a marketing strategy for energy drinks also causes people to consume excessive amounts in a short time. Advertising energy drinks as liquid replacement drinks encourages overconsumption among young people. As you have emphasized, it is not known for certain whether high-dose caffeine or other components such as ginseng, taurine, and guarana cause heart failure. In addition, some amino acids, such as taurine, are already ingested in the body, and it is not yet clear which amounts are toxic.<sup>3</sup> Tachycardiomyopathy is another usual suspect. Our clinical diagnoses of heart failure, cardiomyopathy, and arrhythmias appear to be the result of chemical damage. A cardiac biopsy is necessary to characterize cardiac damage and understand the mechanism of adverse effects. Nevertheless, due to the technical difficulty of biopsy application and lack of experience, the effect of energy drinks on human myocyte cell damage remains a mystery since histological and biochemical effects cannot be observed. To our knowledge, no human studies have been conducted in the literature. Animal studies have, however, shown a significant increase in heart glucose and glycogen concentrations in rats.<sup>4</sup> For all these reasons, determining the pathophysiology of energy drink-induced heart disease requires considerable effort.

### References

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