Case report

Supraventricular tachycardia due to consumption of excessive energy stimulants

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ABSTRACT

People of all ages are becoming more and more addicted to stimulant medicines and energy drinks for a variety of reasons, including work, sports, and leisure. There are several formulations with different flavors available on the market. Many of these items contain extremely high levels of caffeine as well as a wide range of stimulants that have an array of effects on various body areas. Caffeine use in such excess has been known to produce rhythm disturbances of the heart in healthy people, and when mixed with other stimulants, it can have a range of negative consequences on the way the body functions. Those who use it excessively daily, however, are unaware of the potentially fatal risks linked to these items. We describe a case of a 27-year-young man who presented with new-onset supraventricular tachycardia due to excessive consumption of energy pills that contained high amounts of caffeine. This individual had no significant past medical history and was not a smoker or a regular alcohol drinker.

Keywords: Caffeine; cardiac arrythmias; rhythm disturbances; stimulants; energy drinks.

INTRODUCTION

In our nation, it's incredibly simple to find over-the-counter stimulant medications in the form of tablets, energy drinks, and injections. Caffeine is one of the main ingredients in all these formulations. These energy pills contain more caffeine than FDA's regular caffeine dosage recommendations. Young adults and teens are the target market for these. Numerous studies have hypothesized that these kinds of energy drinks might be a springboard for other types of drug dependence (1). An antagonistic effect at the site of adenosine receptors is the primary mechanism of caffeine activity in the central nervous system. Recently published articles have demonstrated that pre-exposure to coffee may have an impact on the traditional abuse substances (2-4). A major reason for alarm is due to this excessive use of caffeine combined with a variety of drugs whose pharmacological effects and interactions have not yet been thoroughly studied. Regardless, it has been demonstrated previously that using over-the-counter stimulants that include high levels of caffeine and other ingredients increases the risk of cardiovascular issues (5-8).

Case report

A 27-year-young individual who had previously been in good health and had no substantial past medical history reported to our hospital outpatient department and complained that he had been experiencing intermittent palpitations for the last two days. The patient neither smokes nor uses the illicit substance, but occasionally drinks alcohol. He had no known history of any risk factors for heart disease. The patient started using a pre-exercise energy supplement pills about three days before visiting the hospital to improve his power for the exercise. The patient had taken an additional three capsules morning on the day of visiting the hospital. He subsequently experienced continuous palpitations and dyspnea and turned out really concerned about them. He straight away attended the medicine outpatient department for immediate assessment and care.

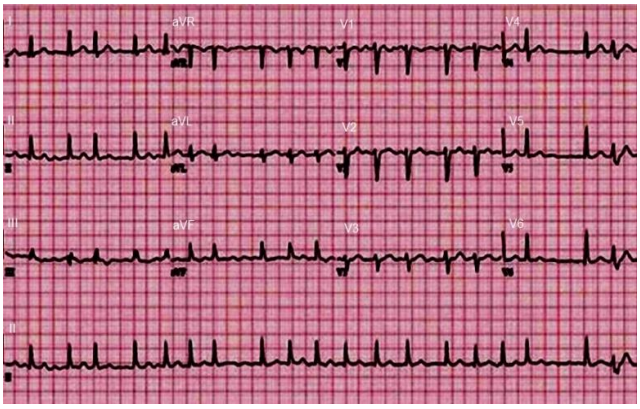

Fig. 1: Initial ECG at presentation showing atrial fibrillation

He was then admitted to our hospital. Except for his high pulse rate of 115 bpm, which was irregularly irregular in character, with apex pulse deficit of 13, rest of his vitals were normal. His routine physical examination was normal. His ECG revealed absent p – waves, irregular rhythm, narrow QRS complexes, with a normal axis suggesting supraventricular tachycardia-atrial fibrillation and with no other significant alterations (Fig.1).

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Eventually, a 2d-echocardiography was performed on the patient, which revealed an LVEF of 65%, and mild mitral regurgitation with no other notable abnormalities. His thyroid function tests were normal. No evidence of narcotics or illegal substance abuse has been established in all investigative workups.

As previously mentioned, the patient's unremarkable 2D-echocardiography, unremarkable laboratory tests, absence of history, and other risk factors for any heart condition, especially atrial fibrillation, were factors that led to the conclusion that his use of over-the-counter energy capsules was the cause of his recent onset supraventricular tachycardia - atrial fibrillation. $CHADS_2$ VASc score was calculated for the patient which came to be 0. Later he was sent home with routine OPD follow-up appointments and was advised to refrain from the usage of those energy pills furthermore. This patient underwent a relieving 3-week follow-up without any additional issues.

DISCUSSION

In our nation, a wide range of caffeine products, ranging from standard coffee to energy pills with high levels of caffeine, are sold. These formulations range in caffeine concentration from 50 - 505 mg per dose. The typical adult's caffeine intake is thought to be 300 mg daily. The widely used energy drinks consist of up to three times as much caffeine as a conventional carbonated beverage and have the potential to significantly improve performance.

An antagonistic effect at the site of adenosine receptors is the primary mechanism of caffeine activity in the central nervous system. By removing the inhibitory action of adenosine on these receptors, caffeine may potentially operate as a drug of abuse by indirectly stimulating the dopamine receptors. In view of this, caffeine has been mentioned in the DSM 4 TR and DSM 5 under the atypical substance of abuse category.

Ingestion of caffeine at levels more than 70 to 80 mg/l has been linked to serious consequences such as convulsions and rhythm disturbances in the heart that can result in death. Dizziness, chest discomfort, dyspnea, palpitations, and syncope are frequent indications of such complications (9). In an individual with pre-existing structural heart disease, the risk of rhythm disturbances and sudden cardiac death increases (5).

The caffeine content of the stimulant drug that our patient took was around 100 mg per tablet, and the company's regular dosage recommendation is 2 to 3 pills per day, which makes around 300 mg of caffeine per day. Apart from caffeine, the other chemicals in our patients' energy supplements are botanical extracts with a variety of chemical properties, and there is a deficit of explicit data in the literature that endorses the usage of such products. If we consider the additional caffeine from those substances in addition to the 100 mg of caffeine per capsule, the total quantity of caffeine per serving may go around 500 mg. If someone ingested these three per day, their daily caffeine intake may go up to 1500 mg roughly.

Treatment of acute caffeine intoxication is often supportive primarily, treating the immediate symptoms. However, if the individual blood levels of caffeine are very high, hemodialysis may need to be considered. It could also be necessary to treat seizures using barbiturates or benzodiazepines. Other treatment techniques include replacing fluids and electrolytes to make up for fluid and electrolyte deficits caused by vomiting and minimize the harm to kidneys. There is no need to restrict caffeine use because modest to moderate levels are typically well tolerated (10). Only very high quantities of caffeine cause arrhythmias.

Like coffee, other stimulants like nicotine and alcohol can cause cardiac rhythms that might be deadly dangerous. Young adults frequently indulge in drug cocktails during parties that contain sympathomimetic drugs including cocaine, amphetamines, and ecstasy, which can cause rhythm disturbances in the heart (11). Arrhythmias may develop in heavy drinkers due to the hyperadrenergic condition, withdrawal symptoms, disturbances in electrolytes, decreased vagal heart rate regulation, repolarization aberrations with longer QT intervals, and increasing myocardial ischemia (12). It is evident that his rhythm problem was not caused by the consumption of alcohol, as our patient is an occasional alcoholic.

The systemic diseases brought on by cigarette consumption, like coronary artery disease and chronic pulmonary disease (which may itself result in rhythm disturbances in the heart), as well as the components of cigarettes, such as carbon monoxide and the oxidative stress they generate, are likely to induce arrhythmias (13). Since our patient did not smoke, smoking would not be considered as the root cause of the present problem.

After discharge, the patient stopped using these energy stimulant medications by himself. This patient underwent a relieving 3-week follow-up without any additional issues. The ingestion of energy booster capsules with an excessive amount of caffeine was

unambiguously the cause of the individual's arrhythmia of the heart.

CONCLUSION

Cardiac arrhythmia is an uncommon but extremely dangerous side effect that can occur after using stimulant medications with very high caffeine content. When used with other drugs, caffeine can have several lethal adverse effects because of their interactions. Therefore, it is essential that manufacturers explicitly state the precise quantity of caffeine per unit in their final product, as well as the medical issues related to caffeine use and the adverse effects of any substances added additionally.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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