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RESEARCH ARTICLE

ASSOCIATION OF BOOSTING ENERGY WITH PSYCHOSIS AND HYPERTENSION IN AN ADOLESCENT MALE IN INDIA: A CASE REPORT

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Abstract

Energy is a fundamental aspect of human health and well-being, significantly influencing cognitive, physical, and emotional functioning. In recent times, there has been an increasing focus on enhancing energy levels to optimize daily performance and improve overall quality of life. This case report explores the significance of boosting energy in the context of its impact on psychosis and hypertension. In conclusion, caffeine-related psychosis in adolescents deserves attention as an emerging public health concern. A comprehensive understanding of the risk factors and implications of excessive caffeine consumption in this vulnerable population is essential to promote healthier habits and protect adolescent mental health.

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Introduction:-

Caffeine-related psychosis in adolescents presents a unique set of challenges due to the ongoing neurodevelopment during this critical life stage. Symptoms of caffeine-induced psychosis in adolescents may include perceptual disturbances, paranoid ideation, cognitive impairments, and emotional dysregulation. As the adolescent brain is still maturing, it may be particularly vulnerable to the disruptive effects of excessive caffeine consumption.¹

The prevalence of caffeine-related psychosis in adolescents is increasing due to factors such as peer pressure, academic stress, athletics, sleep disturbances, and the marketing of caffeinated products by sports personalities targeting youth may contribute to increased caffeine consumption in this age group.² Additionally, adolescents with pre-existing mental health conditions or a family history of psychiatric disorders may be more susceptible to developing caffeine-induced psychosis. The underlying mechanisms of caffeine-related psychosis in adolescents are not yet fully understood. The interplay between caffeine's pharmacological properties, genetic predisposition, and the developing brain's vulnerability requires further investigation. Recognizing the potential risks associated with excessive caffeine intake, preventive measures, and interventions are crucial for promoting adolescent mental health. Education programs aimed at raising awareness of caffeine's effects and promoting healthy caffeine consumption habits can play a significant role.³ Parents, educators, and healthcare professionals should engage in open discussions with adolescents about caffeine use, emphasizing moderation and considering individual differences in caffeine sensitivity.

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Early identification and intervention in cases of caffeine-related psychosis are paramount to prevent potential long-term negative consequences on adolescents' mental well-being. Collaborative efforts between mental health specialists and psychiatrists can facilitate effective treatment and support for affected individuals.⁴

Since the debut of Red Bull, the current worldwide leader of energy drinks, which was introduced in Austria in 1987 and in the United States in 1997, the energy drink market has grown tremendously. Consumption of energy drinks is a common practice among college and high school students and athletes.⁵

People are usually unaware of the combined effects of Caffeine with other products in energy drinks, nor the amount of Caffeine in various brands. These drinks are attractive, especially for our male teenage population, and are easily available at local shops, big grocery stores, gas stations, clubs, and even food courts of shopping malls. The advertisement of these energy drinks includes famous athletic personalities who promote the drink and teenage children are allured by the product. Although it is a source of instant high energy if consumed in excess quantity can lead to severe adverse outcomes that no teenager would have thought of. Different brands of energy drinks available in India include Monster, Red Bull, Prime Hydration, Prime Sports Drink, Gatorade, Ocean Seven, etc. Children and adolescents who are not regular Caffeine users are prone to Caffeine intoxication due to the absence of pharmacological tolerance.⁶ Moderate caffeine intake may have beneficial effects on attention, memory encoding, and mood⁷, though its abuse has been reported in differing patient groups. One recent systematic review identified caffeine as the second most abused substance after tobacco in those with eating disorders⁸, and cases of athletes abusing caffeine for its performance-sustaining effects have also been reported.⁹ Amongst bodybuilders in particular, caffeine abuse may be additionally associated with the presence of body dysmorphic disorder.¹⁰ It has also been proposed that consumption of high doses of caffeine may be used to self-medicate depression.

Case Presentation:

We report the case of 16 years 16-year-old boy, who presented to the emergency of SGT University Hospital Gurugram, Delhi NCR India with his parents who complained the patient was getting "too aggressive". He had been continuously talking to people who did not exist and was shouting to the walls". When asked about whom is he talking to the boy only said, "You all know him but why are you pretending if he's not there." The parents also reported that the boy has had complaints of palpitations off and on for the last month.

The patient had to be mechanically restrained in the emergency department, as he was getting abusive and also tried to hit the nurse who tried taking his vitals. He was then administered with a 2 mg of lorazepam intramuscularly. Examination revealed no injuries, He was then involuntarily detained in a psychiatric ward for further investigation and treatment. The following day, during the initial psychiatric assessment on the ward, the patient exhibited agitation and anxiety and revealed he consumed about 80–100 cans of "Monster" energy drink in the past 2 weeks, an average of 3 cans per day estimated daily total of 960 mg caffeine in the days preceding his admission, as training for a football match for annual sports meet in his school. He denied illicit drug use. Family members had not noticed any significant deterioration in mental state during this time. His behavior leading to the current presentation was considered out of character. The patient's past psychiatric history consisted of one episode of low mood 1 year prior due to not being able to perform well in sports and not getting the "best sports boy award". On both occasions, no referral to psychiatric services was made, and no treatments were initiated. There was no family history of mental or physical illness. The patient complained of back pain and headache soon after admission to the psychiatric unit. Physical examination findings and vital signs showed he had a blood pressure of 150/95. On earlier visits to a local primary care doctor, his blood pressure readings were in the range of 140-160/ 80–100 mm Hg. The boy's blood pressure was raised on more than 3 occasions on the same day of arrival.

To a visit to his primary care 6 months prior his blood pressure was normal. His history revealed that he had. The rest of the history was unremarkable. Examination revealed a regular pulse of 110/min and B.P of 150/95mm Hg. There was no radio femoral delay or renal bruit. The rest of the general and systemic exam was unremarkable. His labs were ordered to rule out secondary causes of hypertension. CBC, FBS, Lipids, Cr, Na+, K+, UDR, TSH, VMA levels, and ECG were all within normal range. He was advised to abstain from energy drink use and to monitor his blood pressure. His readings returned to normal and palpitations were resolved within 2 weeks of discontinuing energy drinks' usage.

Discussion:-

“Energy drinks” are beverages that contain caffeine, taurine, ginseng, guarana, vitamins, herbal supplements, and sugar. They are merchandised for high energy, performance, and concentration. The market for energy drinks is rapidly growing and the annual worldwide energy drink consumption is increasing day by day. According to a self-report survey, energy drinks are consumed by 30 to 50% of adolescents and young adults. They are available in around 140 countries in the world including India.¹¹

This patient was diagnosed with caffeine-related psychosis associated with excessive consumption of energy drinks. There are currently no operationalized criteria for a diagnosis of caffeine-related psychosis, though some have proposed psychosis may occur when caffeine concentrations reach 10-15 mg/kg.¹² ICD-10 provides no specific guidance on the diagnosis of caffeine-related psychiatric disturbance, but the reported case would meet the criteria for the diagnosis of “mental and behavioral disorders due to use of other stimulants, including caffeine.” The Diagnostic and Statistical Manual for Mental Disorders 5th Edition (DSM-V) proposes caffeine-related syndromes, with this case fulfilling the criteria for a diagnosis of “other caffeine-induced disorders.” The DSM-V expounds that “these caffeine-induced disorders are diagnosed instead of caffeine intoxication or caffeine withdrawal only when the symptoms are sufficiently severe to warrant independent clinical attention” and notes that similar disorders such as “caffeine-induced anxiety” disorder would also come under this diagnostic category. Caffeine intoxication (sometimes referred to as “caffein-ism”) shares many physiological and psychological features with anxiety disorders and typically occurs when the daily intake of caffeine is over 1000 mg.¹³ Death has been described from caffeine toxicity, with potentially lethal doses being associated with plasma concentrations of 70 mg/L and above. A recent review of deaths associated with caffeine use highlighted a number of suicides where caffeine toxicity has been implicated (usually with consumption of caffeine-containing pills, rather than energy drinks).¹⁴ Caffeine is thought to exert its stimulant effects via antagonism of adenosine A2A receptors (A2AR), and stimulant effects have been reported with other A2AR antagonists. Whilst the exact mechanism remains yet to be fully elucidated, pharmacological studies suggest this may be due to caffeine’s antagonism of A2AR leading to inhibition of internalization of membrane-bound A2AR- and Dopamine D2 receptor heteromers within striatal neurons.¹⁵

Globally, young adults especially students and athletes are primary targets of campaigns carried out by energy drink companies. They are frequently consumed by athletes prior to competitions with a view to improving their performance.¹⁶ They are also consumed by a large number of students especially while studying for Exams to cope with stress and increase concentration.

In a survey of 496 college students conducted in the Central Atlantic region of the United States, 51% reported consuming at least one energy drink in one month. It was found that 67% used it for reducing sleep, 65% used it for enhancing energy, and 54% used it with alcohol at parties “to look cool”. Out of all, 22% reported having headaches after it and 19% had palpitations.¹⁷

Our case was also a student who had consumed the energy drink “Monster” to enhance his athletic performance. Ingredients of the energy drink “Monster” and many other energy drinks include- carbonated water, glucose syrup, sucrose, acidity regulators like citric acid and sodium citrate, taurine (400mg/100ml) preservatives like sorbic acid, benzoic acid, artificial sweeteners (sucralose), vitamins (B3, B6, B12) glucuronolactone (2mg/100ml) inositol (2mg/100ml), guarana and caffeine (0.03%). Caffeine is the main active ingredient in energy drinks and its concentration is almost 3 times more compared to that in cola drinks but it can go up to 5 times, because of added products like guarana. Guarana is a plant that contains caffeine, theobromine, and theophylline which are chronotropes and inotropes respectively.¹⁸ Doses of caffeine found in energy drinks can range from 80 to 300 mg in a 240 ml-ounce serving. Some brands are sold in 500ml or 700ml sized cans and bottles, which increases the chances of caffeine consumption.¹⁹ The FDA presently regulates the amount of caffeine in soft drinks to a specific maximal dosage and also requires warning instructions to be written on over-the-counter stimulant medications as well as soft aerated drinks like cola, but energy drinks are not subjected to the same regulations although they contain much higher caffeine content. The product “Monster” which our case consumed is the 250 ml (single serving) bottle that does have an ingredient label but no health warning or adverse effects mentioned.

Caffeine intoxication is a documented clinical syndrome included in the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) and the World Health Organization’s International Classification of Diseases (ICD-10).²⁰ Excessive caffeine consumption has been found to have injurious health consequences. A pilot study²¹ conducted on 18–45 years old healthy, normotensive, non-smoking subjects found that single-day energy drink supplementation

increased mean 24-hour and daytime blood pressure compared to caffeinated beverages like coffee alone that does not cause a rise in blood pressure if used in a moderate quantity of 2 cups a day. In India, numerous children and adolescent athletes consume energy drinks before and after sports activities to boost their energy. The majority of them are totally unaware of their ingredients and their harmful effects as there is no clear health warning about them. Moreover, the advertisement of energy drinks only focuses on the increased energy that it provides and also hires known athletes like cricket players of the national cricket team to increase their marketing. Producers of energy drinks usually target young adults who are easily lured to consume energy drinks after watching numerous appealing marketing advertisements on television, in newspapers, and in magazines.²²

Our case was also totally unaware that “Monster” had high caffeine levels and harmful adverse effects on health. Regulation of energy drinks, including content labeling and health warnings, has differed across countries. The USA has the laxest regulatory requirements and is also the largest market for these products. The absence of regulations has resulted in aggressive marketing of energy drinks.

Caffeine is metabolized by the CYP1A2 cytochrome P450 enzyme, acting additionally as a CYP1A2 autoinhibitory, which has theoretical implications for the choice of antipsychotic treatment in caffeine-related psychosis (as clozapine, haloperidol, and olanzapine are metabolized by this enzyme).²³ The metabolism of caffeine produces 14 metabolites, some of which also possess A2AR antagonist properties, and some of which also undergo subsequent renal excretion.²⁴ This case highlights the consequences of excessive energy drink consumption that psychiatrists and physicians should be aware of, as they have implications for safe treatment and prognosis. Inquiry into caffeine intake and use of energy drinks may often be overlooked in psychiatric assessments. Due to its widespread use in the population, the potential for abuse, and the diverse potential psychiatric sequelae, caffeine consumption should be specifically assessed in the clinical history.

Conclusion:-

There are numerous false perceptions in society about the positive benefits and harmful effects of energy drinks. There is a strong need to create awareness through health education regarding these drinks especially among children as they are exposed to an ever-increasing range and easily accessible energy drinks market. There is also a strong need for legislation regarding mandatory labeling of the exact caffeine content of these drinks and with strong health warnings regarding potential health risks. These health warnings must also be included in TV commercials and print media advertisements.

Consent

"Written informed consent was obtained from the patient's mother, as the patient is a minor, for publication of this Case report. A copy of the written consent is available for review by the Editor of this journal."

Abbreviations B.P: Blood Pressure; CBC: Complete Blood Count; FBS: Fasting Blood Sugar; Cr: Creatinine; Na+: Sodium; K+: Potassium; UDR: Urine Detailed Report; TSH: Thyroid Stimulating Hormone; VMA: Vanillylmandelic Acid; ECG: Electrocardiogram; FDA: Food and Drug Administration.

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