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Pathomorphological Changes in Internal Organs Under the Influence of Energy Drinks

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Summary: Energy drinks (ED) are commercially available over-the-counter beverages with high caffeine content that promote energy, including mental activity and physical performance. More than 50 brands of energy drinks are available in grocery stores, food centers, beverage stores, and online. . There is insufficient information on the negative effects of ED on the human body

According to scientists, a few cases of clinically apparent acute liver injury resulting from excessive consumption of ED may even lead to death or urgent liver transplantation. The components of ED that cause liver damage are not clear, and it is clear that caffeine itself does not cause liver damage. Caffeine can damage the developing nervous system in children. The child becomes capricious, impressionable, quickly tired, daytime and nighttime sleep is disturbed.

Thus, ED overdose has been associated with several cases of clinically apparent acute liver injury, which may be severe and lead to death or urgent liver transplantation.

Keywords: Energy drinks, internal organs, liver, brain, caffeine.

Caffeine stimulates excitation processes in the cerebral hemispheres, increases motor activity, mental and physical work abilities, and endurance. Also, while reducing the feeling of fatigue and sleepiness, it temporarily enhances diet, memory, and reactions. According to BJSST experts, (2014) in Europe, 1/3 of adults, every fifth child and 2/3 of teenagers consume energy drinks. While the demand for caffeine at this time is 8.0%, as in adults, this demand in children is much higher than that of adults, equal to 43.0%. Therefore, scientists warn that the risk of caffeine intoxication is higher in children than in adults. Additionally, 70% of 18- to 29-year-olds drink energy drinks mixed with alcohol or consume energy drinks containing alcohol [4,9].

In November 2013, a group of deputies of the Russian State Duma submitted to the lower house of the parliament for consideration a new draft law "On restriction of consumption and retail sale of non-alcoholic sedative drinks" [13]. In the Russian Federation, there is a legislative base that regulates the production and circulation of non-alcoholic ED. The safe level of caffeine consumption is fully regulated. According to the technical regulation of the Customs Union "On Food Safety", the level of caffeine in soft drinks should not exceed 150 mg/l [3, 4, 18].

Caffeine is one of the essential components of all energy drinks. [1, 7]. While it has a stimulating effect, it cannot be a source of energy by itself. It has a low toxic effect, and when consumed in large doses and continuously, it causes psychomotor agitation, affective insomnia, tachycardia, arrhythmia, increased arterial blood pressure, nausea, notes. Caffeine-containing energy drinks (both artificial and natural) can cause serious health problems in people prone to cardiovascular diseases who consume them daily: arterial blood pressure increases, pulse frequency increases, and in some people, it causes arrhythmia [10, 18].

Patients with epilepsy, hyper excitability, insomnia, uncontrollable arterial blood pressure, cardiac rhythm and conduction disturbances, and glaucoma cannot consume caffeine [16]. Caffeine may be dangerous in the elderly, including individuals with cardiovascular disease and other chronic noncommunicable diseases [6, 15]. In vigorous physical activity, the recommended dose of caffeine (3-6 mg/kg) is taken 1 hour before exertion [2, 8]. Reducing fatigue, drowsiness, improving mental and physical performance - all this is a temporary effect of the effect of excessive doses of caffeine, which is replaced by even more fatigue and exhaustion.

If you do not give the body proper rest and drink another cup of coffee or black tea, then you can significantly exceed the permissible dose of caffeine, because it is slowly removed from the body [5,19].

Caffeine is completely removed from the body of a healthy adult after 5-7 hours, from the body of a smoker - after 3 hours, from a pregnant woman - after 18-20 hours, and from a newborn baby - after 30 hours.

Natural coffee and tonic drinks, including energy drinks, are included in the list of products and containers that are not allowed to be sold in public catering establishments of educational and secondary educational institutions. Although the

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existing measures for managing the health risks associated with the consumption of caffeine-containing products in the Russian Federation are sufficiently reasonable and even stricter than abroad, the management of the risks associated with the consumption of alcoholic energy drinks remains questionable [8, 12].

In Russia, in 2015, the sale of alcoholic energy drinks was completely prohibited by law in 25 entities such as "Jaguar", "Otvertka" [4, 17].

This [11, 20]. A study by scientists showed that oral administration of an energy drink (ED) to rats for 12 weeks caused varying degrees of liver and kidney damage. An increase in the level of liver enzymes in the blood serves as a reliable indicator of liver damage by toxic substances. It was demonstrated that total bilirubin, ALT, ALP and AST in the serum of rats were higher than the untreated control group when ED or alcohol were consumed alone or together [12]. However, some other based studies have produced data that diverge from these results. For example, ED consumption was reported to be associated with an increase in plasma total protein and a decrease in creatinine, albumin, and uric acid levels [14, 16]. However, other researchers did not find a significant relationship between caffeine consumption and serum urea and creatinine levels in rats [17, 22].

Energy drinks are defined as commercial over-the-counter beverages with high caffeine content that are advertised as boosting energy, including mental performance and physical performance. More than 50 brands of energy drinks are available in grocery stores, food centers, and beverage stores and online. The ingredients in energy drinks that cause liver damage are not clear, and caffeine itself has not been linked to liver damage. Obvious histopathological changes were observed in the liver and kidney tissues of ED-treated rats, and oral exposure to ED in rats for 12 weeks caused significant liver and kidney damage, probably due to increased free radical formation and oxidative stress.

Thus, excessive consumption of EDs causes pathomorphological changes in internal organs and is associated with several cases of clinically evident acute liver injury, which may lead to urgent liver transplantation or death.

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