

ЭКСПЕРИМЕНТАЛ ТАДҚИҚОТЛАР ЖУРНАЛИ

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ALIMOVA Shakhnoza Azamatovna

Bukhara State Medical

Institute

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RENAL PARENCHYMA OF ENERGY DRINKS INFLUENCE ON MORPHO-FUNCTIONAL CHANGES

ANNOTATION

Energy drinks are a special type of carbonated drinks that, when consumed by manufacturers, are able to increase physical activity and improve performance the most common symptoms after heavy consumption of energy drinks are heart rate acceleration, irritability, limb tremors and gastrointestinal disorders.

There are more than 500 trade names for energy drinks in the world, which, as of 2018, differ significantly in composition. At the same time, regardless of the specific brand, the unifying feature of all such drinks is the presence in them of high-dose substances and compounds with a stimulating-tonic effect (caffeine, Guarana, taurine, ginseng, glucuronolactone, L-carnitine, vitamins V, etc.).

Keywords: energy drink, kidney, caffeine, taurine, ginseng.

ENERGETIK ICHIMLIK LARNING BUYRAK PARENKIMASINING MORFO-FUNKSIONAL O'ZGARISHLARIGA TA'SIRI

ANNOTATSIYA

Energetik ichimliklar - bu gazlangan ichimliklarning maxsus turi bo'lib, ular ishlab chiqaruvchilar tomonidan iste'mol qilinganda jismoniy faollikni oshirish va ish faoliyatini yaxshilashga qodir energetik ichimliklarni ko'p iste'mol qilishdan keyin eng ko'p uchraydigan alomatlar yurak urishining tezlashishi, asabiylashish, oyoq-qo'llarning titrashi va oshqozon-ichak kasalliklari hisoblanadi.

Dunyoda energetik ichimliklarning 500 dan ortiq savdo nomlari mavjud bo'lib, 2018 yil holatiga ko'ra, ular tarkibida sezilarli darajada farqlanadi. Shu bilan birga, o'ziga xos brenddan qat'iy nazar, barcha bunday ichimliklarning birlashtiruvchi xususiyati ulardagi yuqori dozadagi moddalar va rag'batlantiruvchi -tonik ta'sirga ega birikmalarning (kofein, guarana, taurin, jenshen, glyukuronolakton, L-karnitin, B vitaminlari va boshqalar) mavjudligidir.

Kalit so'zlar: energetik ichimlik, buyrak, kafein, taurin, jenshen.

ВОЗДЕЙСТВИЕ ЭНЕРГЕТИЧЕСКИХ НАПИТКОВ НА ПОЧЕЧНУЮ ПАРЕНХИМУ ВЛИЯНИЕ НА МОРФОФУНКЦИОНАЛЬНЫЕ ИЗМЕНЕНИЯ

АННОТАЦИЯ

Энергетические напитки - это особый вид газированных напитков, которые, по мнению производителей, способны повышать физическую активность и улучшать работоспособность. Наиболее распространенными симптомами после обильного употребления энергетических напитков являются учащенное сердцебиение, раздражительность, дрожь в конечностях и желудочно-кишечные расстройства.

В мире насчитывается более 500 торговых наименований энергетических напитков, которые по состоянию на 2018 год существенно различаются по составу. При этом, независимо от конкретного бренда, объединяющей чертой всех подобных напитков является наличие в них высоких доз веществ и соединений, обладающих стимулирующе-тонизирующим действием (кофеин, гуарана, таурин, женьшень, глюкуронолактон, L-карнитин, витамины В).

Ключевые слова: энергетический напиток, почки, кофеин, таурин, женьшень.

The use of energy drinks is growing every day. Energy drinks were originally introduced in the UK in 1929 as a hospital treatment drink; In 1980, they were advertised as energy drinks to replenish lost energy. They are now present in over 140 countries as part of a multi-billion dollar business (Higgins J.P., 2018). In the 1960s, they appeared in Asia and Europe (Usman A., 2015).

Energy drinks contain caffeine (the main active ingredient), herbal stimulants (eg, guarana, mate), simple sugars (eg, glucose, fructose), glucuronolactone (a natural glucose metabolite), amino acids (eg, taurine, carnitine, creatine), or plants (eg ginkgo biloba, ginseng) and vitamins provide energy using a combination (Akande I.S., 2014). Although these ingredients (water, caffeine, carbohydrates, vitamins, amino acids, and minerals) are responsible for the functions of energy drinks such as improving energy levels, increasing physical activity, reducing mental fatigue, and improving mood, they can also cause dangerous effects. possible (Ebuehi O.A., 2017) [1, 2, 3].

Energy drinks have made young people, office workers, and athletes the biggest consumers of EI because of their ability to increase people's physical endurance as well as mental alertness (Higgins et al., 2018). A number of Saudi studies have shown that more than half of users are young (13-35 years old), the majority have been taking it for more than a year, and more than 40% drink more than 3 cans per week. (Elsoada S, 2016). According to WHO (2014), the dangers of excessive consumption of energy drinks among young people and their long-term consequences, which are ignored by scientists and the public, may become a serious public health problem in the future (Breda JJ., 2014).

Today, the opinions of scientists and experts are divided: some believe that energy drinks are completely harmless, similar to ordinary carbonated water, while others, on the contrary, believe that energy drinks can act like drugs and cause addiction. emphasizes (Shalygin L.D., 2016). Gunja N., Brown JA. (2012) reported that over the past 7 years (2011-2018), the most common symptoms after high consumption of energy drinks were increased heart rate, nervousness, tremors, and gastrointestinal diseases.

D. Kelsey, A.J. Berry et al. (2019) reported that excessive consumption of caffeinated energy drinks was associated with psychosis or acute renal failure. This is the first case in which the patient has simultaneous information about kidney failure and psychosis. Research by Rayed Al Yacoub, Debra Luchkiewicz, Christopher Kerr (2018) has reported several cases of energy drink-induced acute kidney injury or acute hepatitis, but this is the first case to be observed simultaneously [4].

Higgins J.P. and others. According to (2015), caffeine, a component of energy drink, is a psychoactive component. Unlike tea or coffee, caffeine in drinks is in the form of a synthetic alkaloid. The amount of caffeine in energy drinks ranges from 32 mg to 130 mg per 100 ml of product. The amount of caffeine in energy drinks (small cans of about 60 ml) is about 6-12 times higher than the concentration in a cup of coffee.

Another common ingredient in energy drinks is guarana or guarana extract. According to its pharmacological properties, guaranine is similar to caffeine. This fact means that energy drinks containing guarana and caffeine may have a dual stimulant effect. Such a dose of stimulants can increase the negative effects of energy drinks on the human body (Finnegan D. 2003). From 2004 to 2012, the US Food and Drug Administration identified 166 adverse reactions to energy drinks, including 18 deaths. It is worth noting that the reports only describe the side effects of energy drinks, but there is no information about the volume of energy drinks consumed in each case (Higgins J.P., 2018) [5, 6].

Most of the side effects of consuming energy drinks are observed in the cardiovascular and nervous systems, and to a lesser extent in the digestive system and kidneys (Rao N., et al. 2017).

Another organ that is affected by energy drinks is the kidneys. The reason is that there are cases of acute kidney failure in people who frequently and in large quantities of drinks of this category (Greyene E., 2014, Kelsey D., 2019). Commercially available EIs are initially harmful to the kidneys and increase blood pressure due to their high caffeine content. Excessive consumption of EI among young adults has become a major health threat and is expected to become a major public health problem in the future. Therefore, this study was conducted to understand the mechanism of energy drink effects on blood pressure and kidney by biochemical analysis of serum glucose, urea, creatinine, uric acid, calcium (Ca) and phosphorus levels. In addition, we studied the molecular expression of some genes related to renal physiology and mechanisms of renal blood pressure regulation. For example, renin, ACE, Ang II, angiotensin type 1 receptor, etc. (Tamer Ahmed Ismail, 2018).

The results of this study show that exposing rats to high doses of Red Bull for 12 weeks caused liver and kidney damage. A significant decrease in the main antioxidant enzymes in the blood indicates that the harmful effects of Red Bull are associated with an increase in the production of AFK.

If extrapolation from animals to humans is allowed, these results call for restraint and caution in the use of Red Bull and other EIs. As a result of EI exposure to rats for 12 weeks, it caused significant liver and kidney damage due to increased free radical production (Kasim A.Kh., 2018).

In recent years, along with the increase in the consumption of energy drinks, a number of studies have been conducted that show and explain their toxic effects on various organs of the body (Piccioni A., 2020). In an experimental study, oral administration of Cod Red at 10 mL/kg/rat/day for 30 days resulted in kidney damage such as vacuolar degeneration and coagulation necrosis of the renal tubular epithelium, glomerular atrophy, and occlusion of blood vessels in the glomerular and interstitial spaces. Increasing the dose to 20ml/kg, we can see that the above histological changes are obvious and severe in kidney sections (increased glomerular atrophy, massive coagulative necrosis of renal tubular epithelium, significant dilation of blood vessels and degeneration of renal tubular epithelium). (Mansy W., 2017). They found that low doses of energy drinks cause mild to moderate kidney damage, while high doses cause severe damage. (Salih N.A., 2018) In addition, cases of kidney damage have been reported in humans as a result of consumption of these drinks (Greyene E., 2014).

Ebuehi O.A. and others. (2012), consumption of energy drinks increases the amount of total protein, triglycerides, HDL and LDL, but decreases the amount of ALT, AST, creatinine, uric acid and albumin. In contrast, Bukhar M.H. and others. (2014) and Khayyat L.A. and others. (2014) documented a significant increase in liver enzyme activity in animals fed energy drinks.

Furthermore, Ugwuja (2014) reported that consumption of energy drinks alone or in combination with alcohol resulted in significant changes in a number of biochemical parameters such as total white blood cell count, plasma potassium, calcium, kidney, liver enzymes and plasma triglycerides. emphasized that it will be the cause.

Latifa Hayot et al. (2014) showed dilated glomerular capillaries with a thickened basement membrane in the renal corpuscles when they fed Power Horse, Red Bull, and Code Red energy drinks at 1.5 ml/100 g of body weight daily to rats for 4 weeks and showed Bowman's capsule. p locations were closed. In addition, fusion of podocyte pedicles was observed in some areas. The results of the study showed that energy drinks can cause irreversible structural changes in rat kidney tissue, which can play an important role in kidney dysfunction [7, 8].

Akande et al. observed the nephrotoxic effect of Power Horse EI at different doses in rats and proved that the damage caused by the energy drink was reversed within 28 days (Akande I.S., 2014). This study used low doses (which was the equivalent of one can in humans. It showed that histological changes occurred after the energy drink. After intoxication, it leads to the accumulation of reactive oxygen species, which further exacerbates cell damage, with cells it destabilizes the contact zones and separates the epithelial cells from the basement membrane. Salih also obtained similar results in albino rabbits using different doses of Red Bull (Salih N.A., 2018).

Necrosis of kidney nephron tubules was observed after energy drink, which is the most common cause of acute kidney injury. The death of tubular epithelial cells leads to kidney failure. The observed necrosis was significantly restored after removal of EI (Schöfl A.I., 2012). In different experimental groups, a coagulation form of necrosis was observed, which is more common in toxic or ischemic injury. Damage to mitochondrial membranes of experimental rats, changes in ATF production, hypoxia and cell death - necrosis may be associated with the presence of carbon dioxide in energy drinks (Aziz F., 2018).

In another study, necrosis was observed in the seminiferous tubules of male rats after administration of Red Bull (Al-eryani F.S., 2018). Kidneys play an important role in eliminating toxic substances. High caffeine content of energy drinks has a negative effect on kidney function. In this study, we observed the severity of kidney damage, such as changes in kidney mass, hyperemia, hemorrhage, and necrosis, depending on the time and duration of EI use. Changes in these histological features showed improvement after energy drink withdrawal. Our findings are consistent with research showing that the effect of caffeine on cell survival is time- and dose-dependent; at low doses, it increases cell survival (Tran S., 2017).

In conclusion, currently there are few studies conducted by scientists on the effects of energy drinks on the human and animal body, as well as on the morpho-functional changes of the kidney parenchyma after the effect of energy drinks and their systemic effects. there is not enough scientific information about the secret. It is desirable to determine the structural changes of the kidney parenchyma under the acute and chronic effects of energy drinks, to apply correction methods to reduce the side effects of energy drinks, and to develop laboratory diagnostic analysis studies.

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