



CHANGES IN MORPHOMETRIC INDICES OF GASTRIC MUCOSA OF SEXUALLY MATURE RATS DURING ADMINISTRATION OF ENERGY DRINK WITH ALCOHOL IN DIFFERENT MODES OF PHYSICAL ACTIVITY

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Abstract:

Nowadays, energy drinks occupy one of the leading places in many countries of the world in terms of frequency of consumption. Discussions about the harm or benefit of energy drinks are being conducted by scientists with increasing frequency. It is proved that energy drinks have a negative effect on some organs and systems, but their influence on the gastrointestinal tract is not sufficiently studied. It is of great practical interest to study the complex influence of energy drinks on the gastrointestinal tract, and, in particular, on the stomach at regular, long-term use of energy drinks, as well as at their use against the background of physical activity.

Keywords: stomach, morphology, energy drink, physical load, rats

INTRODUCTION. In the last decade energy drinks occupy one of the leading places in many countries of the world in terms of frequency of consumption. This is facilitated by the acceleration of the rhythm of life in large cities, advertising in the mass media, a growing range of products and increased recognition. According to some experts, the interest in energy drinks is linked to the effects of the pandemic. Many people were forced to work remotely from home. Which led to disruption of biological rhythms, emotional overexcitement, mental and physical discomfort. To feel awake and full of energy people resorted to the help of energy drinks. These drinks first appeared on the market in the 80s of the twentieth century and gradually gained popularity. Thus, according to the 'Market Analysis of Energy Drinks in Russia', in 2021, the import of energy drinks in Russia increased by 43.5% - from 44.5 to 63.9 million litres. Manufacturers of these drinks claim that their product contains natural ingredients that increase attention, energy, concentration and are harmless to health. However, negative effects of energy drinks on the central nervous system [1; 2], cardiovascular system [3], urinary system [4; 5], and digestive system [6; 7; 8] have been proven. Also in the scientific literature until now there are discussions about the negative impact of energy drinks on the body and in particular on the digestive system, opposing opinions are expressed. In addition, energy drinks are often associated with sports, which is due to the popularity of their use during physical exertion. In general, this scientific direction is

relevant and it is expedient to study possible changes in the tissues of the stomach of rats during the introduction of energy drinks.

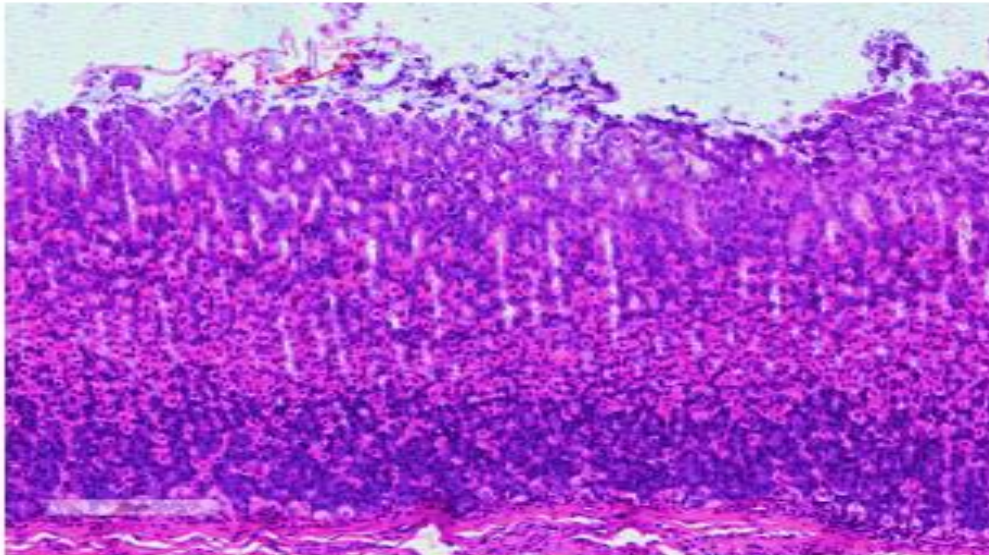
Objective: to study the features of the structure of the stomach of rats under the influence of an energy drink with alcohol in different modes of physical activity.

MATERIALS AND METHODS: 36 four-month-old male white rats were taken for the experiment. The animals were divided into groups: control - distilled water was administered at the rate of 10 ml/kg; 1st experimental group - 'Godzilla' was administered in the same volume with the addition of 0.24 ml/kg of alcohol 40°; 2nd experimental group with daily additional load (running on a treadmill for 10 min) combined with the introduction of the drink and alcohol, as in group 1. The animals were withdrawn from the experiment in stages - on days 10, 30 and 60. Sections stained with review stains were prepared from fragments of gastric tissue. Morphometric analysis included: measurement of mucosa thickness, height of the covering epithelium and depth of glands, counting the number of epitheliocytes in 1 fossa, counting the number of principal, parietal and supplementary cells. The obtained data were processed mathematically using Mann-Whitney coefficient, the differences were considered significant if the probability of error was $p \leq 0,05$.

RESULTS AND THEIR DISCUSSION: statistical processing of the obtained results showed that the height of the covering epithelium increases in both experimental groups, but in the second experimental

group, with the addition of additional physical activity, this index is consistently higher than in the first. The thickness of the mucous membrane and depth of gastric glands increases after 10 days of

experiment in the 1st experimental group by 15.22%, in the 2nd by 11.7%, when increasing the frequency of administration up to 30 days, these indicators in both experimental



groups are close to the control. However, at further introduction of energiser up to 60 days the thickness of the mucous membrane and depth of glands increases with preservation of the same tendency.

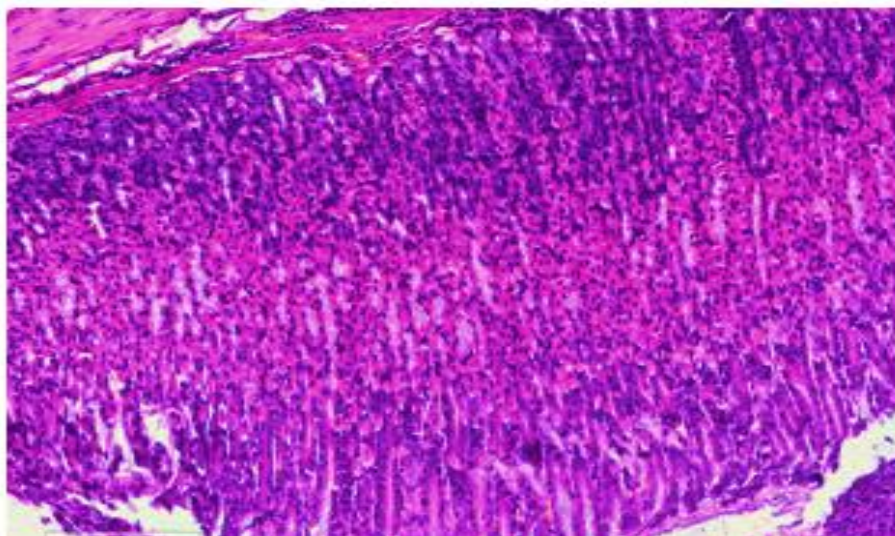


Fig. 1. Mucosa of the glandular part of the stomach of control rats (A) Haematoxylin and eosin staining. Eq. x100



Fig.2. 1st experimental group (B). Duration of the experiment is 30 days.

The number of epitheliocytes in gastric fossae at 10-day administration of energiser is 11.69% higher in the group with added physical activity. At thirty times administration of energiser with the addition of alcohol their number is on average the same in both experimental groups. The number of parietal cells in the structure of gastric glands increases slightly on the 30th day of the experiment in the two experimental groups, and then decreases again by the 60th day of the experiment. The difference between the groups is not significant. The number of principal cells in all groups and at all times is not significantly different. The number of supplementary cells increases significantly with the course of the experiment.

CONCLUSIONS: regular administration of an energy drink with added alcohol leads to changes in the structure of the gastric mucosa of the same direction in animals of both experimental groups. The revealed changes consist in an increase in the height of the covering epithelium, an increase in the thickness of the mucosa and depth of gastric glands, an increase in the number of parietal cells and a significant increase in adventitious cells. The administration of energy with added alcohol on the background of physical load causes the same changes in the structure of the gastric mucosa of rats as in the group without load, but to a lesser degree of severity.

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