

EFFECT OF SUGAR SUBSTITUTE SODIUM CYCLAMATE ON CARBOHYDRATE METABOLISM IN LIVER TISSUE

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Introduction

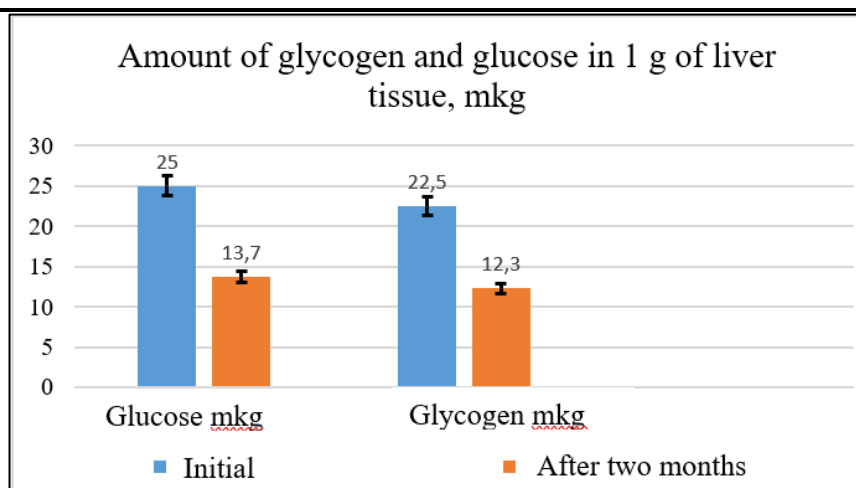
In this paper, the effect of sodium cyclamate as a artificial sugar substitute, on the amount of glucose and glycogen in the liver tissue of rats was studied under experimental conditions. When sodium cyclamate was administered orally at a dose of 10 mg/kg/day for 60 days, it was observed that the amount of glycogen in the liver tissue of experimental animals decreased. The results indicate the role of sodium cyclamate, a sugar substitute, in the disturbance of carbohydrate metabolism in liver tissue.

Purpose of study. The main purpose of the experiment is to evaluate the effect of sodium cyclamate on the amount of glucose and glycogen in liver tissue.

Marial and methods. Experiments were conducted on 10 white male rats weighing 160-180 g. Sodium cyclamate was administered to animals as an aqueous solution at a dose of 10 mg/kg/day for 2 months. To determine the amount of glucose and glycogen in the liver of experimental animals, before the start of the experiment and at the end of the experiment, the animals were lightly sedated with diethyl ether and decapitated. Before decapitation, the body weight of the animals and the weight of the extracted liver were determined. 100 mg of liver tissue was extracted and the amount of glucose and glycogen was determined using anthrone reagent. 0.2% anthrone reagent prepared with 95% sulfuric acid, glucose standard solution, and 30% potassium hydroxide solution were used for the experiment. (Практикум по биохимии: Учеб. пособие/Под ред. С.Е. Северина, Г.А. Соловьевой. Изд. МГУ, 1989. – 23-24 с.).

Result and discussions. As a result of long-term intake of sugar substitute products, it was found that they affect glycogen synthesis in the liver. According to the results of the experiment, we can see that the amount of glucose and glycogen in the liver tissue decreased by 45.2 and 45.3%, respectively, as a result of the consumption of sodium cyclamate. (picture 1).





Picture 1. Effect of sodium cyclamate on indicators of carbohydrate metabolism in liver tissue

Note: * - $p < 0,05$ reliable compared to initial indexes.

Under the influence of sodium cyclamate, which suppresses sugar, glucose absorption and transport disorders in the intestines, insulin resistance, and glucose control disorders develop by reducing the volume of insulin secretion. Intestines play a big role in this, artificial sugar substitutes affect intestinal microflora and its function, change glucose absorption and glucose levels. The main part of glucose is absorbed through the enterocytes of the small intestine with the help of GLUT-1 located in the apical membranes and with the help of GLUT-2 located in the basolateral membranes. Glucose binding to sweet taste receptors stimulates the secretion of GLP-1, GLP-2 and gastrointestinal peptide, and as a result, the release of GLUT-2 increases. Experiments carried out in mice revealed activation of GLUT-1 under the influence of sucralose, saccharin, and acesulfame-K. However, these substances do not affect T1R3 or α -glucose.

Conclusion

The amount of glycogen accumulated in the liver tissue of healthy experimental animals is almost 2 times more than that of those who consumed sugar substitute products, which indicates that carbohydrate metabolism is normal. It was found that chronically introduced synthetic sodium cyclamate solution affects carbohydrate metabolism in the body and has a negative effect on glycogen formation.

