Effect of Garlspin and Glicoinuvit Tablets on Carbohydrate and Lipid Metabolism in Alloxan Diabetes

The paper observes hypoglycemic and lipolytic properties of garlspin and glicoinuvit tablets. Garlspin and glicoinuvit have been found out to possess a noticeable hypoglycemic effect when treating alloxan diabetes. As distinct from many peroral hypoglycemic drugs, glicoinuvit has a positive effect on lipoid metabolism and hepatofunction.

Ziyoda Faiziyeva, Xabibullo Aliyev, Nemat Olimov
Department of Pharmacology, Tashkent Pharmaceutical Institute, Uzbekistan

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Introduction

Diabetes mellitus is a chronic disease characterized by hyperglycemia owing to insulin secretion defect. Disorder of its activity or both of these causes lead to pathology of metabolism, damages nervous system and vessels, and changes in different organs and tissues.

Diabetes mellitus takes the third place among chronic noninfectious diseases in the world after cardiovascular and oncological ones in a lethal structure. In industrially developed countries 6-10% of population suffer from this disease, so it might be evaluated as pandemic. According to WHO data, about 80 million of patients all over the world had diabetes incidence in 2003, this number was expected to reach approximately 200 million in 2005, and more than 230 million in 2010 (Ametov, 2003; Balabolkin, 2000).

Such a situation makes highly important quests and study by pharmacologists of new hypoglycemic substances on the basis of plant raw materials. This paper discusses hypoglycemic and lipolytic properties of garlspin tablets made on the base of garlic powder, as well as glicoinuvit - from a powder of Helianthus tuberoses L. tubers.

Materials and methods

The investigations were carried out on white rats (males and females) weighed from 180 to 220 gm. Rats were rendered diabetic by alloxan single subcutaneous injection at a dose of 170 mg/kg (Baranov, Sokoloverova, Galkaryan, et al., 1983). Two days later a blood glucose level was determined by enzymatic method. Afterwards the animals were divided into two groups: the first one - animals with mild course of diabetes and the second group included animals with average extent dangerous diabetes.

The first group included the rats with a slight hyperglycemia form (11.8-13.1 mmol/l), and the second one had the animals with average extent serious form of hyperglycemia (19.2-21.9 mmol/l). The laboratory animals were treated with garlspin tablets (per os) at a dose 50 mg/kg, glicoinuvit - 50 mg/kg, glipil -25 mg/kg, glibenclamide - 5 mg/kg.

Control group of the rats was given a physiological solution in the appropriate volume. The drugs were used within 20 days. Blood glucose level was determined at the 10th and 20th days. Glicoinuvit effect on lipoid metabolism was studied in comparison with lipoic acid in separate series of experiments. They were carried out on 36 rats weighed 170-178 gm under the terms of alloxan diabetes. The animals were delivered with glicoinuvit perorally at a dose of 50 and 100 mg/kg, and lipoic acid-per 20 mg/kg.
Results and discussion

Blood glucose level has been found out decreased 20 days later after use of the drugs at above mentioned doses when treating diabetes in a slight form; after taking garlspin tablets at a dose of 50 mg/kg blood glucose reduced by 31.6% comparing with the control. When taking glipil and glibenclamide the blood glucose lowered by 36.3% and 47.8%, respectively, in comparison with the control.

20 days later, the control rats with mild alloxan diabetes had glycemic level of 10.6 mmol/l. Delivering garlspin tablets to rats with average extent dangerous course of diabetes, the blood glucose level reduced by 29.9% during 20 days. After administration of glipil and glibenclamide – by 32.9% and 42.3%, respectively, compared with the control.

After glicoinuvit administration in alloxan diabetes, with mild and average extent forms of the blood, glucose reduced by 19.7% and 21.7%, comparing with the control group. 20 days later in control rats with average extent serious alloxan diabetes, glycemia level came to 15.8 mmol/l.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Intact animals</th>
<th>Alloxan (control group)</th>
<th>Alloxan+ glicoinuvit (50 mg/kg)</th>
<th>Alloxan+ glicoinuvit (100 mg/kg)</th>
<th>Alloxan+ Lipoic acid (20 mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total lipoids, gm/l</td>
<td>9.8±0.1</td>
<td>16.5±0.2*</td>
<td>11.5±0.3</td>
<td>11.2±0.4</td>
<td>10.1±0.1</td>
</tr>
<tr>
<td>Cholesterol, mmol/l</td>
<td>1.3±0.3</td>
<td>8.7±0.1*</td>
<td>5.6±0.2</td>
<td>5.3±0.5</td>
<td>4.45±0.3</td>
</tr>
<tr>
<td>Triglycerides, mmol/l</td>
<td>2.25±0.4</td>
<td>3.3±0.2*</td>
<td>2.3±0.15</td>
<td>2.55±0.2</td>
<td>1.6±0.1</td>
</tr>
<tr>
<td>β-lipoproteids, gm/l</td>
<td>2.4±0.2</td>
<td>2.9±0.1*</td>
<td>2.6±0.2</td>
<td>2.5±0.05</td>
<td>2.25±0.4</td>
</tr>
<tr>
<td>Glucose, mmol/l</td>
<td>5.4±0.2</td>
<td>16.4±0.2*</td>
<td>12.1±0.2</td>
<td>11.5±0.2</td>
<td>10.3±0.2</td>
</tr>
<tr>
<td>Blood ALT, mmol/l</td>
<td>0.29±0.03</td>
<td>1.87±0.03*</td>
<td>0.85±0.06</td>
<td>0.5±0.04</td>
<td>0.7±0.05</td>
</tr>
<tr>
<td>Blood AST, mmol/l</td>
<td>0.43±0.02</td>
<td>2.3±0.05*</td>
<td>0.9±0.08</td>
<td>0.75±0.03</td>
<td>0.95±0.01</td>
</tr>
<tr>
<td>Body weight, gm</td>
<td>178±6</td>
<td>172±5.2*</td>
<td>169±7.4</td>
<td>165±6.0</td>
<td>163±3.1</td>
</tr>
</tbody>
</table>

Note: *P<0.05 reliability regarding intact animals

The effect of glicoinuvit on lipoid metabolism and hepatofunction has been studied on rats (males) under standard condition of vivarium. Alloxan injection is known to cause marked damages of carbohydrate and lipoid metabolism. After glicoinuvit administration during 21 days lipoid metabolism has been normalized. For instance, after therapy with glicoinuvit at doses of 50 and 100 mg/kg, lipoic acid at a dose of 20 mg/kg, total blood lipoids lower 30.3 %, 32 %, and 38.8 %; cholesterol level decreased 35.6 %, 39.1 % and 48.9 %; triglycerides-30.3 %, 22.7 % and 51.5 % in comparison with control. A slight β-lipoproteids lowering has been observed after administration of glicoinuvit and lipoic acid. Besides, hepatofunction has been normalized owing to transaminase activity lowering. Animals weight, while carrying out the experiments, remained invariable (Table 1).

Conclusion

The investigated tablets garlspin at a dose 50 mg/kg have a noticeable hypoglycemic action when experimental alloxan diabetes are just as good as glibenclamide and glipil on their hypoglycemic effect. Glicoinuvit gives a positive effect on lipid metabolism and hepatofunction in alloxan diabetes.

References


Balabolkin, M., 2000. Diabetology [Diabetologiya], in Russian, Moscow, Medicine.