ANTI-INFLAMMATORY ACTIVITY OF GARLIC OIL EXTRACT

The article describes anti-inflammatory activity of garlic oil, caused by formalin and histamine in animals. Pharmacological tests have found out that garlic oil has a strong anti-inflammatory effect and is as effective as indomethacin. It can be used as anti-inflammatory agent of plant origin.

Keywords: Garlic, garlic oil, inflammation caused by formalin, inflammation caused by histamine

UDC: 615.015

Introduction

At present, despite of variety of synthetic drugs, herbal medicinal products are used very popularly. These include garlic - *Allium sativum* L., the lily family (*Liliaceae*), known not only as a valuable food product, but also therapeutic and prophylactic agent used in popular medicine for colds, infections, cardiovascular diseases, diseases of the digestive system, metabolic disorders, etc. (Romashov, 2004). Garlic and its preparations are widely used as antimicrobial agents in the treatment of acute and chronic respiratory diseases. Therapeutic effect of garlic preparations is related with inflammatory activity of sulfur-containing components.

Taking into consideration given the above, we have developed a special technology for the oil extract of garlic, from the raw material grades "South purple", harvested in the Tashkent region. This paper presents the results of the study of acute toxicity and anti-inflammatory activity of garlic oil extract.

Materials and methods

The oil extract was obtained from garlic varieties of "Southern purple" harvested in the Tashkent region, which is a transparent oily liquid red - yellow, with a characteristic odour and taste of garlic. Previously in the series of experiments determined the acute toxicity of garlic oil on white mice of both sexes weighing 18-22 g. Studied drug administered to animals orally at a dose of 0.25, 0.5, 0.75 and 1 ml per animal weight, which corresponds to 12.5 ml/kg, 25 ml/kg, 37.5 ml/kg and 50 mg/kg. Monitoring of the animals were in a vivarium for 14 days. This takes into account the general condition and behavior of animals.

The second series of experiments on 42 rats weighing 146-165 g of both sexes studied the effect of garlic oil on the course of inflammation induced by formalin and histamine.

Results and discussion

1. Study of garlic oil acute toxicity. With the administration of drug in dose of 12.5 ml/kg - 25 ml/kg the general behavior of the experimental animals did not differ from controls. The animals were active, took food and water, reacted to external irritation. Whereas the administration of 37.5 ml/kg and 50 mg/kg promoted a marked restriction of movement, breathing became shallow and frequent. Observed changes lasted for 35-45 minutes, then held their own and the state of the animals returned to baseline. In this case, there were no any pathological reactions in animal behavior. They were active, there were no signs of intoxication and they completely ate food. No deaths occurred during the follow-up
A similar pattern in the same conditions were also found in the behavior of mice in the study of acute toxicity of garlic tablets (Aliyev, Aminov and Olimov, 2003). The facts can admit that garlic oil pills have relatively low toxicity.

2. The result of the effect of garlic oil on the course of the inflammation caused by formalin and histamine. Experiments with the effect of garlic oil in aseptic arthritis caused by the introduction of 0.2 ml of 2% formalin solution in the back surface of the aponeurosis of the ankle, were held on 24 rats of both sexes, weighing 146-165 g. Anti-inflammatory activity of the drug was determined by the difference between the volume before and after administration of formalin.

Measuring the volume of rat paws were made after injection of formalin in an hour for 2, 6 and 24 hours. Garlic oil was administered 45 minutes prior to the introduction of formalin 1 per day for 3 days and the orally at a dose of 0.5 to 1 ml per animal weight.

It was found that garlic oil has an inhibiting effect on the development of formalin inflammation. So, if in a control of group rats (6 pcs.) increase in feet relative to baseline against formalin inflammation was 98.6%, in the group of test animals under the influence of garlic oil in the studied doses, the figure was 67.3% and 63.1%, appropriately. As a control, in the same conditions the anti-inflammatory activity of the known drug indomethacin is in dose of 15 mg/kg, 62.5%.

From the data in table number 1 we can conclude that the garlic oil in the studied doses clearly reduces inflammation caused by formalin, and in this respect it is not inferior to indomethacin.

Effect of garlic oil on the course of inflammation caused by histamine was performed on 18 rats of both sexes, weighing 146-163 g. Histamine inflammation caused the introduction of 0.15 ml of 0.1% solution of histamine in the back surface of the aponeurosis of the ankle joint of rats. Garlic oil was injected 1 time a day for 3 days and in 45 minutes prior to administration of histamine in a dose of 0.5 and 1 ml of the mass of rats.

As the table shows, studied oil in doses of 0.5 and 1 ml of the mass of rats has a considerable anti-inflammatory action. If the average growth of feet of the control animals at the height of histamine inflammation is 100%, in the experimental group under the influence of garlic oil, the figure was 69.8% and 65%, appropriately. Therefore, garlic oil in the studied doses is of anti-inflammatory effect in 30.2% and 35% approximately (Table 1).

### Table 1. The Influence of Studied Garlic Oil on the Course of Inflammation Caused by Formalin and Histamine

<table>
<thead>
<tr>
<th>No.</th>
<th>Studied drugs</th>
<th>Number of animals, pieces</th>
<th>Doses, ml/kg</th>
<th>The average volume of rat paw normal, ml</th>
<th>After 4 hours after injection of formalin in ml</th>
<th>Average increase in rat paw volume relative to the initial</th>
<th>Anti-inflammatory effects, in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>In experiments with formalin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Control</td>
<td>6</td>
<td>1 ml H₂O</td>
<td>0.71</td>
<td>1.41</td>
<td>0.70±0.074</td>
<td>98.6</td>
</tr>
<tr>
<td>2</td>
<td>Garlic oil</td>
<td>6</td>
<td>6.5</td>
<td>0.70</td>
<td>1.15</td>
<td>0.45±0.075</td>
<td>63.1</td>
</tr>
<tr>
<td>3</td>
<td>Garlic oil</td>
<td>6</td>
<td>3.5</td>
<td>0.72</td>
<td>1.20</td>
<td>0.48±0.053</td>
<td>67.3</td>
</tr>
<tr>
<td>4</td>
<td>Indomethacin</td>
<td>6</td>
<td>15</td>
<td>0.71</td>
<td>1.15</td>
<td>0.44±0.035</td>
<td>62.5</td>
</tr>
<tr>
<td>In experiments with histamine</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>5</td>
<td>Control - II</td>
<td>6</td>
<td>1 ml H₂O</td>
<td>0.73</td>
<td>1.46</td>
<td>0.73±0.072</td>
<td>100</td>
</tr>
<tr>
<td>6</td>
<td>Garlic oil</td>
<td>6</td>
<td>3.5</td>
<td>0.74</td>
<td>1.24</td>
<td>0.51±0.051</td>
<td>69.8</td>
</tr>
<tr>
<td>7</td>
<td>Garlic oil</td>
<td>6</td>
<td>6.5</td>
<td>0.75</td>
<td>1.22</td>
<td>0.47±0.031</td>
<td>65.0</td>
</tr>
</tbody>
</table>

Note: * - data reliability P <0.05 compared to control
Thus, comparison and analysis of the data suggests that the studied garlic oil in equal measure influences on inflammation caused by formalin and histamine. It does not only delay the development of inflammation, but also significantly speeds up its back development.

**Conclusion**

According to the literature the erosive and ulcerative lesions of the upper gastrointestinal tract is seen in 15-25% of patients who regularly take non-steroidal anti-inflammatory drugs. According to the authors data (Shostak and Ryabkova, 2003) long-term use of NSAD in 12-30% of cases leads to the development of stomach ulcers, and in 2-19% of cases the lesions 12 duodenal ulcer, and in the elderly up to 30%. Consequently, the use of modern anti-inflammatory drugs does not always produce the desired results. All this makes researchers continue to seek out and explore new harmless, highly active drugs. Taking into consideration the above mentioned study of the anti-inflammatory activity of plant and substances isolated from plants used in traditional medicine has a certain practical value.

As a result, pharmaceutical pre-clinical trials it was found out that the acute toxicity of garlic oil is relatively of low toxicity. It has a pronounced anti-inflammatory effects and is as effective as NSAD - indomethacin. It can be used as anti-inflammatory agent of plant origin.

**References**


Romashov, M., 2004. The healing power of nature. Treatment with garlic [Celitelnye sily prirody. Lechenie chesnokom], in Russian, Moscow: Vecho

Shostak, N., Ryabkova, A., 2003. “Gastrointestinal bleeding as a complication of gastropathy associated with NSAID,” Therapeutic Archives [Terapevticheskiy arhiv], in Russian, No.5, pp.70-73