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Antioxidant Properties of Nepeta Olgae Regel L. Plant Extracts Growing in Namangan Region

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Abstract: We were the first to study in vivo, the antioxidant properties of the extract of the plant Nepeta Olgae Regel. Nepeta Olgae Regel extract has been determined to inhibit free radicals in the body. Experiments have shown that plant extracts inhibit the processes of peroxidation in the heart.

Key words: plant, disease, raw materials.

1. Introduction

One of the priority directions of the search for new plant sources of biologically active substances is the study of poorly studied wild flora species of Uzbekistan, whose reserves are still quite large. Such an approach will provide a long-term reliable raw material base, will allow rational use of these plant resources and will make it possible to expand the range of medicinal plant raw materials and medicines based on them.

The main source for the search for new medicinal plants is the arsenal of traditional medicine. From this point of view, the plants of this family are of particular interest. Yasnotkovye (lat. Lamiáceae). Many species of famous species are Salvia, Melissa, Scutellaria, Rosmarinum, Lavandula and others. they have long been firmly included in the arsenal of official medicinal plant raw materials not only in many foreign countries, but also in Uzbekistan.

The purpose of this study was to study the antioxidant properties of Nepeta Olgae Regel plant extracts, which belong to the family of Clear-cut plants.

It is known from the literature that herbal tinctures from plants belonging to the genus Olga kotovnik were used in the treatment of anemia [1-4]. Kotovnik grass is traditionally used in folk medicine for the treatment of chronic bronchitis, gastric catarrh, liver diseases, gastrointestinal diseases, atony, anemia, shortness of breath, spasmax; it is used as an antipyretic, tonic, diaphoretic and stimulant [2-4]. According to the literature, the causes of the above diseases are caused by changes in the tissues and cells of the body at the molecular level and an increase in the number of free radicals [3-6].

Therefore, today it is recommended to use antioxidants in natural extracts from plants in the treatment of neurodegenerative, hepatic and other pathologies. It should be noted that the study of oxidative stress when using natural antioxidants in the mechanisms of disease development remains the most urgent scientific and practical task.

In this regard, pharmacological studies were conducted to determine the effect of Nepeta Olgae Regel plant extracts on the increase in the content of MDA in the products of liver and heart tissue POL under oxidative stress.

2. Materials and Methods

The experiments were performed on purebred white male rats (180-200 g). Studies on experimental animals were conducted in accordance with the rules of the International Helsinki Declaration, developed by the Council of International Medical Scientific Societies (CIOMS; the council for international organizations of medical sciences). The studies were conducted in vivo.

In the study, rats were directed to a stress model to study pathophysiological changes associated with the antioxidant system in homogenates prepared from liver and heart tissue, and to assess the anti-stress activity of plant extracts that reduce stress effects. An oxidative stress model called PbCl2 was used, which is the most widely used model of oxidative stress.

The rats isolated for the experiment were divided into groups: group I - control (n=5), group II - experiment (PbCl2, n=5), group III - experiment (PbCl2 + 10 mg/kg of aqueous extract, n = 7), group IV (PbCl2 + 10 mg/kg of butanol extract, n = 5) and group B (20 mg/kg of PbCl2 + extract precipitate, n = 5). To induce oxidative stress, laboratory animals of groups II, III, IV and V were injected once subcutaneously into the abdominal cavity with a solution of PbCl2 at a concentration of 30 mg/kg.

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Determination of the amount of malondialdehyde. MDA forms a colored trimethine complex with 2-thiobarbituric acid at high temperature and acidic environment. The reaction gives a pink color [3]. The number of MLAs was calculated using the following formula:

Determination of catalase activity. The color intensity was measured on a spectrophotometer at a wavelength of 410 nm relative to a sample containing 2 ml of H2O instead of H2O2.

Catalase activity in tissues was expressed by the amount of catalase and calculated according to the following formula [4].

Determination of the activity of the enzyme superoxide dismutase. Determination of the activity of the enzyme SOD (CF 1.15.1.1) Misra and J. Fridovich (1972) method. The principle of the method is based on nitrotetrozole blue (NTC) for superoxide anions formed as a result of aerobic interaction and reducing the amount of NADH, phenosine metasulfate (FMS) [5].

Statistical processing of the obtained results. The results of the study were performed using optical measurements on a Cary 60 Agilent Technology spectrophotometer. The obtained results were performed using the Origin 6.1 computer program (USA) for statistical processing. In experiments, the model of oxidative stress was performed by calculating the arithmetic mean based on analyses of liver and heart tissues of animals. The difference between the values obtained in vivo experiments is the t-criterion. $R < 0.05$; $p < 0.01$; The values were expressed in terms of statistical reliability.

3. Results and Discussion

Under conditions of oxidative stress, the product of lipid peroxidation may increase as a result of accelerated peroxidation of phospholipids by the membrane of liver and heart muscle cells. The following experiments were carried out to determine the effect of chloroform, ethyl acetate and butanol extracts on increasing the content of the POL MDA product in liver and heart tissue under oxidative stress.

I group of experimental animals was healthy and had no effect. As an experiment, animals of group II, called oxidative stress, were obtained. A model of oxidative stress induced by PbCl2 was administered orally to rats of group III at a dose of 10 mg/kg from chloroform extract, group IV from ethyl acetate extract and group V from butanol extract at a dose of 20 mg/kg for 8 days. Liver and heart muscle tissue of an experimental group of animals called oxidative stress were isolated and homogenized, and the content of MDA was determined in them. The results showed that the amount of MDA in liver homogenate was 1.94±0.04 mmol/g of protein in the control. The amount of MDA in the liver homogenate of group II rats caused by oxidative stress was 2.87 ± 0.17 mmol/g of protein. This represents an increase of 47.9% compared to their control. Oxidative stress is explained by the increased formation of metabolites in hepatocyte cells that are actively involved in enzymatic processes during development. The products of H2O2, NO, OH• metabolism formed in liver cells and other types of radicals can reduce the anticoagulant activity of tissues and cells. When treating group III rats induced by oxidative stress with chloroform extract for 8 days, the content of MDA in their liver homogenate was 2.41 ± 0.15 mmol/g of protein (Fig. 1). It was found that the amount of MDA decreased by 16% under the influence of the extract in relation to oxidative stress (group II). During pharmacotherapy of rats with oxidative stress caused by ethyl acetate and butanol extracts, the content of MDA in liver homogenate in them was 2.21±0.13 mmol/g and 2.10±0.11 mmol/g, respectively, and decreased by 23% and 26.8%, respectively, compared to the pathological group. The amount of MDA in the homogenates of the cardiac tissue of group II rats caused by oxidative stress was 2.87 ± 0.17 mmol/g of protein. This represents an increase of 47.9% compared to their control. Consequently, the extracts had a partial inhibitory effect on the processes of lipid peroxidation in liver cells formed under stress. At the same time, the decrease in the amount of MDA of butanol extract was more pronounced than that of other extracts. These extracts can exhibit antiradical activity by suppressing the formation of free radicals that occur during oxidative stress.

The process of oxidative stress causes both molecular biochemical and physiological changes in the heart muscle tissue. Increased production of reactive oxygen species in cardiac cardiomyocytes damaged by stress factors may adversely affect their contractile properties and the permeability of calcium ions in the cytosol. With the development of oxidative stress, the number of products of peroxidation of MDA membranes of cardiomyocytes may increase, and they can be neutralized with extracts from various plants. To test this hypothesis, our next experiment studied the effect of extracts on rat heart muscle cells in a model of oxidative stress induced by PbCl2. According to the results obtained in the study of the content of MDA by homogenizing the heart tissue of rats in the control group without effect, it was found that the content of MDA is 1.19±0.11 μmol/g. The content of MDA in the heart homogenates of rats of group II, caused by oxidative stress, was 2.17±0.15 μmol/g of protein, which is 82.3% more than in the control. During pharmacotherapy of rats of groups III, IV and V, caused by a model of oxidative stress with plant extracts (chloroform, ethyl acetate, butanol) for 8 days, it was found that their MDA content in the heart homogenate decreased by 19.3%, 27.6% and 37.8%, respectively.

4. Conclusions

Thus, in the heart tissue under conditions of oxidative stress, an increase in lipid peroxidation products is observed. In particular, the stress-related increase in the amount of MDA in the POL product is explained by a violation of the structure of cardiomyocyte membranes. Since heart muscle cells are very sensitive to oxidative stress, the intensity of phospholipid hydrolysis of their cell membranes may increase. Experiments have shown that plant extracts inhibit the processes of peroxidation in the heart.

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