

THE RESEARCH ABOUT ANTIOXIDANT ACTIVITY OF PEPTIDES OBTAINED FROM JERUSALEM ARTICHOKE PROTEINS

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ABSTRACT

In this work, the antioxidant activity of peptides obtained from Jerusalem artichoke proteins using acidic and neutral pretenses was studied. It was seen that products with prophylactic properties, received using the latest technology from local varieties of Jerusalem artichoke, determine the high antioxidant activity of peptides of protein origin. The obtained proteins can be applied as a source for the production of antioxidant peptides.

Keywords: Jerusalem artichoke, proteins, hydrolysis, malt proteinase, acidic proteinase, neutral proteinase, peptides, antioxidant properties.

INTRODUCTION

Nowadays, one of the urgent problems in the food industry is the search for a directed and rational use of natural resources and the creation of practically useful materials and technologies on their basis.

It is known that one of the promising, unique crops for the processing and production of various types of food, medicinal and technical products and feed is Jerusalem artichoke - an earthen pear. Present time, this valuable culture is spread all over the world and is used for various purposes.

One of the ways to provide the population of Uzbekistan with full-fledged, environmentally friendly functional food products from non-traditional raw materials, capable of performing preventive and therapeutic functions, is the industrial processing of Jerusalem artichoke using an innovative technology which was developed at the TCHTI. Jerusalem artichoke is used for the production of functional food, which contains in its native form a significant amount of physiologically active macro-micro-nutrients, and also additionally enriches food with biologically active substances.

Modern technologies for the production of Jerusalem artichoke from non-traditional agricultural raw materials for various products has a fairly wide range: functional food, beer and soft drinks, as well as for therapeutic and prophylactic food, dietary supplements, etc. as powders, juices and concentrates.

The use of Jerusalem artichoke and its processed products in the production of various food products for the modern lifestyle of a person, a decrease in the immune status of the body, a deterioration in the ecological situation necessitates an increase in the quality and safety of existing food products and the creation of new ones with functional properties.

New generation products should not only satisfy the body's need for nutrients and energy, but also help improve the quality of life, increase immunity and vitality. Consumers prefer natural food products, which creates the preconditions for the widespread use of raw materials containing functional ingredients in physiologically significant quantities. The greatest success in processing technologies and the use of Jerusalem artichoke has recently been achieved almost all over the world.

The developed technology for producing Jerusalem artichoke powder deserves great attention. Powder from tubers is a good biological additive in many food products, and is also widely used in food technology in the production of beer and soft drinks, vegetable and fruit drinks, jelly, marmalade. Adding it to bakery, meat and dairy products, first and second courses significantly increases the nutritional and biological value of these products and leads to a decrease in their glycemic index and calorie content.

The chemical composition of local varieties of Jerusalem artichoke of our republic has been studied by our scientists, and the amino acid, carbohydrate composition of local varieties is much higher than that of Russian

cultivated and studied varieties. Jerusalem artichoke protein is characterized by its amino acid composition, biological and high nutrient content. It is widely believed that all amino acids are needed only in sufficient quantities and in optimal proportions for normal metabolism.

The aim of this work is to study the antioxidant properties of peptides derived from Jerusalem artichoke proteins. Antioxidants (antioxidants) are substances that are involved in the autooxidation process and form stable intermediates, thereby blocking the oxidative chain reaction. As a result of lipid oxidation, toxic compounds accumulate in the human body, large quantities of which adversely affect human health [1; 2].

Recently, more and more problems are being solved with the use of antioxidants, which allow, in a safe way, to suspend the processes of oxidation of lipid connective substances and the formation of free radicals, thereby increasing the level of antioxidant protection of the human body. Based on this, an intensive search for drugs around the world is being carried out, having a high concentration of antioxidant substances and antioxidant properties of the products.

In modern concepts of nutrition, more and more attention is paid to the minor components of food in many respects determining its preventive and therapeutic effect [3]. Numerous bioantioxidants are among the most representative micronutrients, i.e. compounds that reduce the activity of radical oxidative processes. Food antioxidants (antioxidants) include substances that slow down the oxidation of primarily unsaturated fatty acids that make up lipids. This class of food additives includes three subclasses, taking into account their separate technological functions: 1) antioxidants; 2) antioxidant synergists; 3) complexing agents.

The use of antioxidants makes it possible to extend the shelf life of food raw materials, intermediates and finished products, protecting them from damage caused by oxidation with oxygen in the air [4].

Recently, much attention has been paid to the use of natural antioxidants based on polyphenols and proteins obtained from plant materials [5]. Proteins are an especially important substance in human cells and play an important role in human nutrition. The Jerusalem artichoke powder studied by us is characterized by a high content (7-8%) of protein in comparison with potatoes. The content of thiol amino acids in proteins is 4 times higher than their content in potato protein.

As you know, the products of protein hydrolysis have antioxidant properties. At the same time, the content of thiol amino acids plays a significant role in the manifestation of antioxidant activity. Therefore, peptides obtained from plant proteins are becoming the subject of close attention of scientists. For example, by enzymatic hydrolysis of proteins albumin [6], protein from soy [7], soluble elastin [8], active peptide antioxidants and peptides that utilize free radicals have been obtained. Moreover, using different enzymes from one protein source, peptides with different properties can be obtained. [9].

Our research has shown that Jerusalem artichoke proteins are a good raw material for obtaining antioxidant peptides. In fig. 1. shows the hydrolysability of Jerusalem artichoke powder proteins with various proteinases.

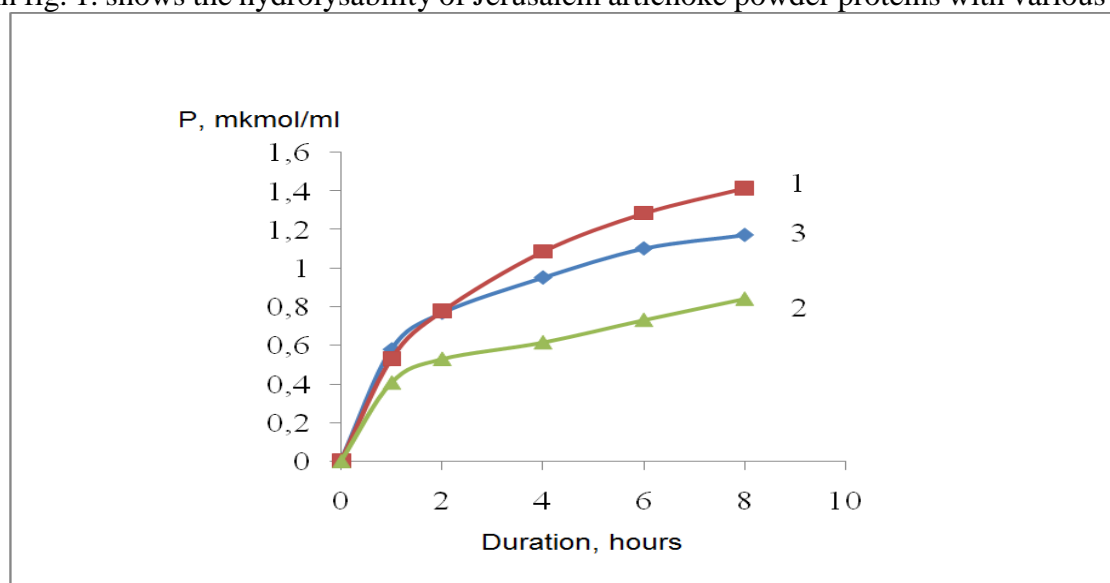


Fig. 1. - Enzymatic hydrolysis of various Jerusalem artichoke proteins with proteinases.

- 1-proteinase from malt
- 2.acid proteinase
- 3-neutral proteinase

Proteinases of malt and microbial acidic and neutral proteinases were used as proteinases. From the presented data, it can be seen that, depending on the source of the enzyme, the rate of protein hydrolysis is different. With the help of malt proteinases, proteins undergo enzymatic hydrolysis at the highest rate (Fig. 1, curves 1). During 6 hours of fermentation under the indicated conditions, the formation of hydrolysis products from alkali-soluble proteins was 1.4 mmol / ml. In the case where acidic proteinase was used 0.8 mmol / ml and 1.1 mmol / ml in the case of the use of neutral proteinase. Thus, hydrolysis of Jerusalem artichoke proteins is most rapidly hydrolyzed by malt proteinases.

Protein hydrolysis products have antioxidant properties. Moreover, their activity depends on the enzyme used. The research results are shown in Fig. 2.

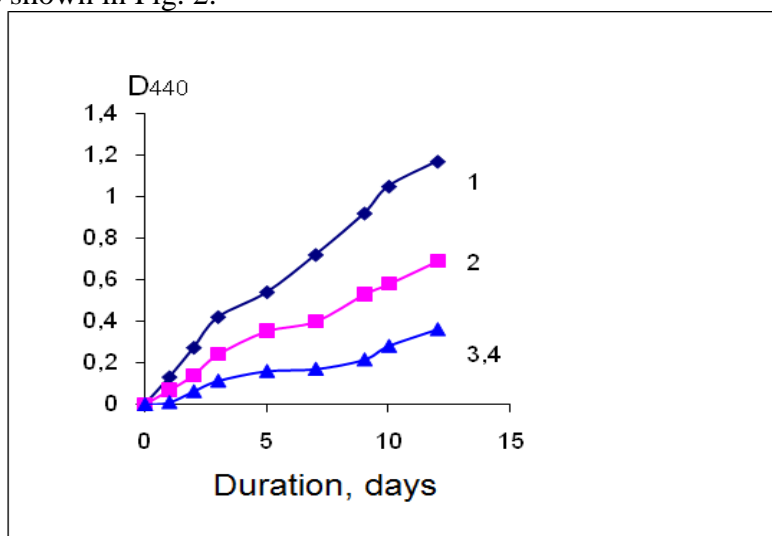


Fig. 2. - Influence of peptides derived from Jerusalem artichoke protein on the rate of oxidation of (+) – catechin

- 1- Control
- 2- In the presence of peptides obtained with acidic proteinase
- 3- Peptides derived from neutral proteinase
- 4- Peptides derived from malt enzymes.

From the presented data, it can be seen that the addition of peptides to the reaction medium, where the oxidation of catechin occurs, contributes to a decrease in the rate of oxidation (darkening) of catechin. The optical density of the solution after incubation at 45 ° C for 10 days, in the case when there were no peptides in the medium, was 1.0 units. The addition of peptides under the same conditions reduces the rate of oxidation and the change in optical density is 0.6 units. in the case of the use of peptides obtained by acidic proteinase, and 0.4 units. when using peptides derived from malt enzymes. Thus, peptides derived from Jerusalem artichoke proteins have high antioxidant activity, and these proteins can be used as a source for obtaining antioxidant peptides.

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