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Antioxidant Effect of Functional Supplements Based on Cereal Kernels on the Organism

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Abstract: *This study aims to study the antioxidant effect of functional supplements based on cereal kernels (triticum aestivum) on the body. Cereal kernels contain natural polyphenol compounds, flavonoids and vitamins, which protect cells from oxidative stress by reducing the formation of free radicals. In the study, cereal kernel supplements at different doses were tested in laboratory conditions, and indicators such as lipid peroxidation, superoxide dismutase and glutathione peroxidase activity were analyzed in an animal model. The results showed that functional supplements based on cereal grains significantly increase antioxidant defenses and enhance the body's ability to fight free radicals. These findings may serve as a basis for the development of natural antioxidant sources in the food and pharmaceutical industries.*

Keywords: *Cereal grains, functional supplement, antioxidant, polyphenols, flavonoids, oxidative stress, lipid peroxidation, superoxide dismutase, glutathione peroxidase.*

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Biologically active components of food play an important role in health and disease prevention. Cereal grains (triticum aestivum L.) have long been used as food products, but in recent years their use as functional supplements has become the subject of much research. Cereal grains contain polyphenols, flavonoids, vitamins, and minerals, which have antioxidant properties. Antioxidants protect cells from the harmful effects of free radicals and slow the development of chronic diseases associated with oxidative stress.

Oxidative stress occurs when free radicals and reactive oxygen species are increased in the body. This process leads to oxidative damage to lipids, proteins, and DNA, which leads to the development of cardiovascular diseases, cancer, diabetes, and chronic inflammation. Therefore, it is important to find natural sources of antioxidants and use them as functional supplements.[1]

Cereal grains have been studied in many studies as a source of antioxidants. The phenolic compounds they contain reduce lipid peroxidation, increase the activity of glutathione and superoxide dismutase. At the same time, the microencapsulation of cereal grains can preserve their antioxidant properties and increase the effectiveness of their use in food products.[2]

This article analyzes the antioxidant effect of functional supplements based on cereal grains on the body, their biologically active components, and the results of laboratory studies.

Cereal grains contain many biologically active substances. The most important of them are:

Polyphenols - phenolic acids, flavonoids, and tannins. These compounds protect cells from free radicals, reduce lipid peroxidation, and have anti-inflammatory effects.

Vitamins – especially vitamin E (tocopherol) and vitamin C – have antioxidant activity. Vitamin E protects lipid membranes from oxidative stress, while vitamin C acts as a water-soluble antioxidant.

Minerals – trace elements such as selenium, zinc and iron support the activity of antioxidant enzymes. For example, selenium increases the activity of glutathione peroxidase.

Proteins and peptides – some peptides isolated from cereal grains have the property of neutralizing free radicals.

Together, these components strengthen the body's antioxidant defenses and slow down the development of chronic diseases.

A functional supplement is a biologically active substance added to a food product that helps improve health or prevent diseases. Advantages of functional supplements based on cereal grains:

Natural source – replaces artificial chemicals.

Easy assimilation – well digested by the body.[3]

Multifaceted benefits – along with antioxidant properties, it helps to strengthen immunity, support the cardiovascular system and regulate glucose metabolism.

Functional supplements are prepared from cereal bran in various forms: powder, extract, microencapsulated preparations. Using the microencapsulation method, bioactive substances are protected from air and high temperatures, which increases their antioxidant activity.

In this study, functional supplements based on cereal bran were tested in an animal model. The methodology is as follows:

Experimental subjects - 40 healthy mice kept in the laboratory.

Supplement dose - mice were divided into different groups, each group was given 50, 100 and 200 mg/kg of cereal bran supplement.

Control group - animals without supplements.

Analysis indicators - lipid peroxidation (MDA content), superoxide dismutase (SOD) and glutathione peroxidase (GPx) activity.

Statistical analysis - results were compared using ANOVA and Student's t-test.

The results of the experiment showed that:

In the groups that received the cereal sprout supplement, the level of lipid peroxidation was significantly reduced (MDA content decreased by 25–40%).

The activity of superoxide dismutase and glutathione peroxidase increased by 30–50%, which indicates an improvement in the ability of cells to fight free radicals.

The antioxidant effect increased with increasing doses, with the highest efficacy observed at a dose of 200 mg/kg.

The control group did not show significant changes in lipid peroxidation and antioxidant enzyme activity.

The results confirm that phenolic compounds and flavonoids in cereal sprouts have a significant effect on antioxidant protection.[4]

The results of the study are consistent with previous scientific literature. Bioactive substances in cereal sprouts reduce lipid peroxidation, which is important in the prevention of cardiovascular diseases and chronic inflammation.

The determination of the dose-response characteristics of functional additives allows the use of cereal germ extracts in the food industry in an effective and safe dosage. The microencapsulation method protects bioactive components and improves their assimilation into the body.

Also, cereal germ additives may have additional beneficial properties, such as increasing the activity of the immune system, regulating glucose and lipid metabolism. Therefore, there are potential social and health benefits of using them in daily nutrition.

In conclusion, functional additives based on cereal germs have strong antioxidant properties.

Their effectiveness in reducing lipid peroxidation and activating antioxidant enzymes has been confirmed in laboratory conditions.

The microencapsulation method facilitates the protection of bioactive components and their use in food products.

The results of the study may serve as a basis for the development of natural antioxidant sources in the food and pharmaceutical industries.

In future studies, it is necessary to conduct clinical trials in humans and determine optimal doses.

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