MIRZO ULUG‘BEK NOMIDAGI
O‘ZBEKISTON MILLIY UNIVERSITETI
JIZZAX FILIALI



"BIOTEXNOLOGIYANING RIVOJLANISH ISTIQBOLLARI VA MUAMMOLARI"

MAVZUSIDAGI RESPUBLIKA MIQYOSIDAGI ILMIY-TEXNIK ANJUMAN TO‘PLAMI





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МИНИСТЕРСТВО ВЫСШЕГО ОБРАЗОВАНИЯ, НАУКИ И ИННОВАЦИЙ РЕСПУБЛИКИ УЗБЕКИСТАН

ДЖИЗАКСКИЙ ФИЛИАЛ НАЦИОНАЛЬНОГО УНИВЕРСИТЕТА УЗБЕКИСТАНА ИМЕНИ МИРЗО УЛУГБЕКА

СБОРНИК ТЕЗИСОВ РЕСПУБЛИКАНСКОЙ НАУЧНОЙ КОНФЕРЕНЦИИ

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STUDYING THE EFFECT OF THE GLUTEN FRACTION OF PROTEIN ON THE HUMAN ORGANISM

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Abstract: Gluten is one of the primary proteins found in wheat, barley, and other gluten-containing grains, and its consumption is an integral part of the dietary regime of many people. However, the effects of gluten on the human body and its adverse impact on individuals with conditions such as celiac disease and gluten allergy have been identified. Therefore, the identification of gluten fractions and the study of their effects on the body remain a pressing issue, contributing to the protection of public health.

According to the primary recommendations of physicians for the treatment and prevention of these conditions, individuals must adhere to a strict gluten-free diet that eliminates foods containing gluten protein fractions from their diet. At the

same time, it is emphasized that nutrition should remain healthy and balanced, including all essential nutrients, vitamins, minerals, and complete proteins.

Keywords: gluten, complex protein, fermentation, texture, saccharides, amino acids.

Gluten is a complex protein found in food products such as wheat, barley, and oats. It primarily consists of two main components: gliadin and glutenin. These proteins interact with starch in grains, forming an ideal structural composition.

Key physicochemical properties of gluten: Gliadin – One of the most mobile and elastic components of gluten. Its primary role is to provide cohesion and binding properties to the gluten network. During fermentation, gliadin contributes to viscosity and elasticity, helping maintain the desired texture of food products. Glutenin – Known for its resilience and structural strength. Its molecules are long and relatively immobile, and when combined with gliadin, they form a stable network, preserving the integrity and firmness of the final product.

Starch interacts with gluten but does not undergo a direct chemical reaction with it. Their combination determines the consistency of the final product, influencing its firmness or elasticity. One of the most important properties of gluten is its elasticity and ability to stretch and compress. These characteristics play a crucial role in wheat-based products, as they contribute to the formation of well-structured dough, making it ideal for the production of baked goods and confectionery items.

Forms of gluten and their effects: Gluten molecules contain strong hydrogen bonds, which ensure their cohesion and structural stability. In grains, gluten helps maintain these bonds, contributing to the creation of flavorful and elastic food products. Grains and their derivatives (such as flour, bread, and baked goods) are primarily based on gluten, and the physicochemical properties of gluten play a crucial role in shaping the final products. Thanks to these properties, baked goods such as bread and pastries achieve optimal technical and aesthetic qualities.

1. Content of Gluten: Gliadin: This component is responsible for the elastic properties of gluten. It helps form the gluten network and ensures its high elasticity. **Glutenin**: Strengthens the structure of gluten. Its long and rigid molecules help maintain consistency and stability. Nutritional Content: Gluten is rich in structural polysaccharides and amino acids, giving it complex chemical properties that interact with enzymes, salts, and other compounds during food processing.

2. Benefits of gluten: elasticity and strength: Gluten provides dough with flexibility and elasticity, ensuring that baked goods maintain their shape and structure. This is particularly important for bread and pastries. **High-quality**

protein: As a primary protein in grains, gluten supplies essential amino acids necessary for human metabolism.

Wide Range of Applications: Beyond the food industry, gluten is used in cosmetics, pharmaceuticals, and biotechnology, where its properties contribute to the development of new products. **Technological Convenience**: The strength and elasticity of gluten improve food processing, allowing products to achieve the desired texture and shape, enhancing their appearance and taste.

3. Negative aspects of gluten: gluten sensitivity: Some individuals may develop allergic reactions or sensitivity to gluten (gluten intolerance), which can cause symptoms such as pain, rashes, and abdominal bloating. This condition is commonly known as celiac disease. **Effects on the intestines**: In some cases, gluten can damage the lining of the intestines, leading to inflammation and a reduced ability to absorb nutrients. **Association with diseases**: Individuals sensitive to gluten, its consumption can trigger intestinal disorders such as colitis or dyspepsia. **Excessive consumption of wheat and gluten**: A diet excessively high in gluten may overburden the digestive system, making it crucial to maintain a balanced intake. While gluten has both beneficial and adverse properties, individuals with gluten sensitivity or allergies must take precautions when consuming gluten-containing products. Nevertheless, gluten plays a crucial role in food production due to its unique technological and biological properties.

Challenges of a gluten-free diet: Scientific studies, including those by I.A. Bavaykina, I.I. Loginova, and others [1-3], highlight the difficulties of maintaining a gluten-free diet, especially for young patients and their parents. Children may struggle to understand the importance of dietary restrictions, and challenges often arise not at home but in kindergartens or schools, where gluten-containing foods might be unknowingly served.

Additionally, many low-income families cannot afford gluten-free products, which can be 3-5 times more expensive than regular gluten-containing foods. As a result, children with celiac disease may face psychological stress due to dietary restrictions and financial constraints within their families.

Currently, there are two main methods for producing gluten-free food products: Biotechnological method – This involves selecting gluten-free plant-based raw materials. Biocatalytic method – This method modifies or removes gluten fractions from traditional raw materials. According to Professor V.N. Krasilnikova, the raw materials used in gluten-free product manufacturing are typically classified into four groups based on their chemical composition and their effect on the structural and rheological properties of the dough (see Table 1) [4].

Table 1

Main types of gluten-free plant-based ingredients

№.	The main groups of structure-forming agents
1	Flours rich in starch and non-starch polysaccharides: rice, corn, oat flour, cereals (amaranth, buckwheat) and cereals (millet)
2	High-protein supplements: soy isolates, concentrates, pea protein isolates, lupin, caseinates, whey protein concentrates
3	Hydrocolloids: xanthan and guar gums, various types of native and modified starches, microbial polysaccharides
4	Emulsifiers, dough raising agents, flavorings: melange, lecithin, baking soda, salt, sugar, flavorings, colorings, mineral additives

The structure-forming raw materials used in the production of gluten-free products from Group 1 can be conditionally divided into two subgroups: Subgroup 1: Includes plant-based raw materials with a high starch content that can form sticky and elastic dough masses. Subgroup 2: Characterized by a high content of non-starch polysaccharides, proteins, polyphenols, antioxidants, and other components.

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