

## SENSITIVITY TO GLUTEN

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**Summary:** Introduction: Cereals were introduced as staple diet approximately 10,000 years ago, and today the global wheat production is at an incredible level. Gluten sensitivity is a condition that affects millions of people worldwide and includes a reaction to the gluten protein in grains, not just products from wheat, but also from many others. It's gluten which is important for doctors because it is connected to many diseases and is often mistaken for other sensitivities to the certain ingredients in food (allergies).

The aim of the paper: The aim of this paper is to explain what "gluten allergy" is, i.e. its real name, whether it really exists and how to distinguish it from grain allergy, as well as what the consequences of unreasonable gluten free diet are.

Allergy or intolerance? There is no such thing as gluten allergy, its real name is sensitivity to gluten. The majority of people who are intolerant use the word allergy because it is easier for people to understand it and that name is popular in the public. It is also important to know that wheat allergy is not the same as sensitivity to gluten and that these two different conditions require different types of diet.

Symptoms of gluten intolerance: Symptoms of gluten sensitivity appear after a few hours or days from consuming food containing gluten and most often include gastrointestinal symptoms. Gluten sensitivity is manifested similarly to irritable bowel syndrome and can include pain in the stomach, flatulence, diarrhea, constipation, but also systemic manifestations. There is no specific test or laboratory finding to make a diagnosis for gluten sensitivity, but the diagnosis is made starting a gluten-free diet and then adding one food at a time or products which contains gluten. Also, there exists a whole range of disorders connected with gluten.

Potential side effects of a gluten-free diet: People who choose a gluten-free diet do not have any health grounds for that. It is known that most athletes opt for this diet believing it improves athletic performance and reduces inflammation. However, this diet is often poor in micronutrients, expensive and instead of weight loss, it leads to weight gain.

Conclusion: Cereals are the main source of carbohydrates, they are rich in fibers, vitamins and minerals and should not be avoided unless there is a medical reason to do so. Many doctors are still undecided about whether it is sensitivity to gluten without celiac disease or some other hidden disorder, so that there needs further proof that this condition really exists and what its real mechanism of origin is. All people who are suspected of having a problem with consuming gluten or FODMAPs should consult with a doctor or a nutritionist.

**Key words:** gluten, gluten sensitivity without celiac disease (OGBC), gluten sensitivity, allergy to gluten, allergy to cereals

### INTRODUCTION

Humanity has existed for about 2.5 million years, but cereals as the main component of human nutrition were introduced only about 10000 years ago. By introducing cereals people went from hunting to agriculture, which caused a sharp increase in grain harvest and consumption. Today, global production of wheat exceeds 700 million tons per year [1]. The protein found in wheat is called gluten, however this is a common name for similar proteins found in barley, rye and oats. Gluten in humans can cause several different disorders, among

which is allergy to gluten [2]. This "natural" need to improve production has led to artificial breeding and selection of wheat that was better adapted to extreme climatic conditions and was resistant to the diseases. Such manipulation in wheat has led to drastic changes in genetic diversity and quality of wheat.

Gluten is extremely important in making bread and other products. Gluten (eng. glue - glue) is the component that holds the bread, i.e. it ensures that the dough rises and forms bubbles in fermentation process. Bakery products have a characteristic texture thanks to gluten. Today,

the awareness of the importance of gluten in food production has led to the extraction of gluten from plant seeds and its use not only in most bakery products, but also in the production of sweets, crackers, snacks, candies and the like. It is believed that this genetic modification of wheat and gluten was too much of a shock for our organism and it did not give time for our immunological system to develop natural adjustment mechanisms [2].

This very protein and sensitivity to it has become a major topic of interest and research of the wider public and the interest of the people has led to a huge literature and information that is not necessary reliable [3]. "Allergy to gluten" is a condition which affects millions of people in the world and includes a reaction to the gluten protein in cereals, and not only in wheat products, but also in many others, the proper name for this condition is gluten sensitivity or glutensensitivity without celiac disease.

Demand for and consumption of gluten-free food has significantly increased in the last 30 years . In 2016 almost twice as much money was spent on gluten-free food compared to 2011. Social networks, the media and marketing encouraged a large number of people to interested in gluten-free diet, and the problem is that most people have adopted this way of eating because of beliefs that consumption of food with gluten leads to harmful consequences [4] Today, an increasing number of people opts for a gluten-free diet without a prior recommendation from a doctor, which later makes it more difficult to reach the correct diagnosis.

#### The aim of this paper

Most people who choose a gluten-free diet do so based on information from the media and popular literature, without prior consultation with a doctor. This not only makes it difficult to see the real state of health of a person, but it can also have a negative impact on the individual's health. Gluten is important to doctors because it is associated with many diseases and is often confused with other allergies. The aim of this paper is to explain what "gluten allergy" is, i.e. its real name, whether it really exists and how to distinguish it from a grain allergy, as well as what consequences of groundless restricted gluten-free diet are .

#### Allergy or sensitivity?

Gluten allergy does not actually exist [2]. This

term is incorrect because there is no such thing as allergy to gluten. People who have celiac disease describe their condition as an allergy, because this is the term easier to understand or even they themselves do not know the difference between an autoimmune disease and a sensitivity or allergies. Celiac disease is an autoimmune disease that results in damage to the small intestine that is triggered by consuming food containing gluten [5]. Gluten sensitivity is a condition that exists and is more correct to say that someone is sensitive to gluten, not that they have an allergy. Gluten sensitivity without celiac disease is characterized by intestinal and extraintestinal symptoms related to the intake of food containing gluten, while the person does not have celiac disease or wheat allergy [6]. Unlike celiac disease, patients who are sensitive to gluten do not have celiac disease, that is, the associated antibodies and may be HLA-DK2/8 negative (human leukocyte antigen) nor histological abnormalities of the small intestine. Studies have shown that these people have normal intestinal permeability and do not react to gluten through the activation of immune response [4].

So there is gluten sensitivity, but not gluten allergy. On the other hand, one should know the difference between sensitivity to gluten and allergies to wheat. These two terms do not imply the same problems. Cereal allergies are common and the most common is allergy to wheat which can result in atopic dermatitis, anaphylaxis caused exercise, eosinophilic esophagitis or celiac disease [3]. People who are sensitive to gluten should avoid all types of grains that contain gluten, while people with a grain (wheat) allergy should avoid only wheat while they can eat other cereals [7].

#### Symptoms of sensitivity to gluten

Humans have enzymes that help break down the food they eat. The protein-processing enzyme cannot fully break down gluten and it reaches the small intestine as such. Most people won't have any symptoms after undigested gluten enters the small intestine, but in some it may cause a serious autoimmune response or other unpleasant symptoms. Those symptoms can be intestinal or extraintestinal [8].

Symptoms of sensitivity to gluten are connected with consumption of food which contains gluten and usually they disappear completely when a person does not consume it. Symptoms then

disappear after a couple of hours or days. Manifestation of gluten sensitivity is very similar to irritable bowel syndrome (nervous intestines syndrome) and includes the following:

- pain in the stomach,
- flatulence,
- abnormality in the work of bowels (diarrhea or constipation),
- systemic manifestations (cognitive dysfunction, a headache, fatigue, pain in the joints or muscles, numbness in the legs or arms, dermatitis (eczema or rash),
- depression,
- anemia [9].

If symptoms appear in childhood, typical gastrointestinal symptoms appear (pain in the stomach and/or chronic diarrhea), while fatigue is the most common among systematic ones [9]. Diagnosis of sensitivity to gluten should be considered in all patients who have persistent intestinal or systematic complaints, and at the same time have a regular serological finding. Unfortunately, there still doesn't exist a single precise biomarker which can with certainty point to the existence of sensitivity to gluten. Today this diagnosis is made based on the appearance of symptoms and intake of gluten, compared to placebo-controlled "food challenge" symptoms [6]. When the person goes to the doctor and gluten sensitivity is suspected, the diagnosing process begins. This is done by starting a gluten-free diet (getting rid of all foods, drinks, medicines, cosmetics, etc. that contain gluten). When all of the symptoms withdraw we continue with the introduction of one item after the other and wait for the symptoms to appear. When the symptoms appear after the introduction of a new item, we know which food or product the patient reacts badly to [3].

There are a couple of disorders that gluten can cause when it is consumed and the individual does not react well to it. Some of those disorders are:

OGBC - gluten sensitivity without celiac disease, which was discussed in this article. This term is used to describe a condition where an individual does not have celiac disease or a gluten allergy, but has intestinal troubles after consumption of food which contains gluten;

Celiac disease - the main cause of celiac disease

is sensitivity to gluten, and this is a condition in which the immune system attacks its own tissues when gluten is consumed. These changes mostly they disappear after the start of a gluten-free diet;

Gluten ataxia - there is still no clear evidence of how this ataxia occurs, but we suppose that the antibodies that are formed affect the cerebellum. A gluten-free diet can improve neurological deficits, but it is not always useful, because sometimes damage to the cerebellum can be irreversible;

Dermatitis Herpetiformis - this disorder represents unusual skin changes which are directly related to gluten and celiac disease, and arise as an autoimmune response to gluten intake. It is characterized by persistent itching, inflammatory papules on the skin and vesicles on the forearms, knees, head and buttocks [10]. Potential side-effects of gluten-free diet

Most people who are on a gluten-free diet, as previously stated, do not have any diseases or intolerance to gluten, but still opt for this way of nourishment. The main reason for this is a belief that a gluten-free diet is healthier than a typical high-calorie or grain-rich diet. People who have this way of eating often try to alleviate some symptoms that have not been confirmed by a diagnosis or want a general improvement in their health condition, without any previous symptoms. Many people believe that a gluten-free diet is associated with weight loss. There is even one study that confirmed this theory (a loss of girth in the waist was observed, as well as body weight loss and higher levels of lipoprotein), but the test group was unreliable, so this still remains only a theory [4].

Even athletes advocated gluten-free diet, claiming that improves performance and endurance [4]. Athletes have to plan their own nutrition in detail in order to have optimal performance and of course, for the purpose of reducing gastrointestinal symptoms. It is also believed that gluten-free diet reduces inflammation, however, no theory has yet confirmed this. If an athlete has better performance that can be because he may have undiagnosed celiac disease or simply is losing weight and thereby feels better and moves more easily [11].

A 2015 study of 910 non-celiac athletes found that 41% practiced gluten-free diet more than

50% of the time, and only 13% of them did so because of a previously diagnosed medical condition. 57% reported gluten sensitivity which they noticed themselves (stomach ailments and fatigue). 28.7% respondents found their main source of information online, 26.2% received information from coaches or physiotherapists, while 17.4% received information from other athletes[4].

The negative side of the gluten-free diet is very important. Foods containing gluten (cereals) are at the bottom of food pyramid and are so important for our health. These foods are good option for satisfying daily caloric needs. The consequences of a gluten-free diet are:

A lack of nutrients - cereals from the whole grain are rich in fibers, vitamins and minerals. The majority of gluten-free pasta and bread are not enriched with these micronutrients, which makes their natural intake difficult.

Adding weight - although it was observed that weight can be lost snacks and refined breads can have more fats, sugar and calories, which leads to weight increase.

Price - gluten-free diet is expensive especially for our market. In addition to increased financial sociopsychological influences were observed. This diet requires persistent commitment to limited diet and way of life. A person can feel isolated or have negative comments from the environment [4].

#### OGBC like special clinical entity

Today in the medical world there is much debate about whether gluten sensitivity without celiac disease really exists. Gluten is perhaps one of the most controversial and misunderstood food compounds. And if certain persons are considered to have sensitivity to gluten, many doctors and experts do not accept sensitivity to gluten without celiac disease like special clinical entity. Why is that so?

One of the best examples is precisely the proof that gluten sensitivity without celiac disease actually does not exist. Although the existence of gluten sensitivity (without celiac disease) was proven in one study, later the same people conducted a study and published an article in which they claimed and proved the opposite. The first paper (which showed the existence of this) was published in 2011 and then a study was conducted where it was shown that a diet with gluten can cause gastrointestinal problems even

in people who do not suffer from celiac disease [12]. However, another paper (showing the absence of OGBC) published in 2013 after conducting a study on a small group of respondents, showed that there are no certain, specific responses to gluten. After analyzing the data, it was reported that each diet that was given to respondents, whether it contained gluten or not, encouraged the respondents to report deterioration of symptoms. Even when subjects were given a placebo, respondents again reported deterioration of symptoms. Although the group of respondents was small (37 people), the data clearly indicated that gluten was not to blame for the symptoms, but the reasons were psychological [12]. Precisely because of studies like this, most doctors do not accept the diagnosis of OGBC or sensitivity to gluten without some others, accompanying disorders.

At the same time, the etiology of gluten sensitivity is not clearly understood, and although it is believed that there exists an immunological response to gluten, no study has proved it yet. The other potential culprits include amylase-trypsin inhibitors (ATI) and fructans (found in FODMAPs) [14]. FODMAPs (fermentable oligosaccharides, disaccharides, monosaccharides and polyols) are part of wheat and may play a role in NCGS pathophysiology and development of the symptoms. Placebo controlled study revealed that the symptoms improved with reduced intake of these components, so the conclusion is that the improvement of the symptoms was not due to non-consumption of gluten, but because of FODMAPs. Besides, this study showed that two gluten-free weeks caused a reduction in symptoms compared to that reported during a low-fat diet FODMAPs [15].

There is still much uncertainty about OGBC, and the causes may be gastrointestinal symptoms of gastrointestinal infection, medications, previous surgical procedures, etc. It requires a lot of time to fully understand the mechanism and the real cause of origin of sensitivity to gluten.

#### Conclusion

Although many people notice gastrointestinal complaints after consuming grains and food with gluten, non-celiac gluten sensitivity is still not recognized as a distinct clinical entity. The reason for this is that there is no clear evidence to show that a person has a sensitivity to gluten,

without having some other hidden condition or that the symptoms are not exclusively of psychological nature.

Cereals are the main source of carbohydrates and their absorption takes place in small intestine, providing energy to us. One should always choose whole grain cereals with as little sugar and preservatives as possible. If there is no clear indication for that, one should not decide on a gluten-free diet. If there is any doubt that gluten sensitivity still exists, a doctor should be consulted. In case there is a clear diagnosis for this a person should start with this diet.

These people should avoid flour, bread, crackers,

baking mixes, pasta, cereals, sauces, spices, processed meat, beer, etc. Rice, corn, potatoes, soybeans, fruits, vegetables, meat, eggs, wine and distilled spirits are gluten-free and acceptable to eat or drink, but only when these products are of completely natural origin, because gluten is sometimes used as an additive. Many other products may not have gluten in them, but gluten may have been used in their preparation or packaging. Patients should consult a doctor or a nutritionist.

Debates and conversations about non-celiac gluten sensitivity happen every day, but we have a long way ahead of us in order to understand this condition properly.

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