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The importance of nutrition in the course of celiac disease

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Abstract

Celiac disease is one of the most common autoimmune diseases. It is estimated that it is the cause of health disorders in about 1% of the general population. It is increasingly diagnosed in adults. New diseases affect about 60% of this group, of which 15-20% concern people >60 years of age. The pathogenesis of celiac disease is conditioned by many factors. Cereal proteins referred to collectively as gluten are an important factor that reveals the presence of celiac disease. Consumption of gluten causes an abnormal stimulation of the immune system in genetically predisposed people. Gluten-induced immune system causes the atrophy process to prevail over the regenerative processes in the small intestine. This disorder leads to atrophy of the intestinal villi. The only commonly accepted method of treating visceral disease is the elimination of gluten from food. Proper management of a lifelong disease is based on the continuous acquisition of knowledge and skills that improve the quality of life in all its spheres.

Keywords: gluten, celiac disease, diarrhoea, gluten-free foods

Streszczenie

Choroba trzewna należy do jednej z najczęściej występujących chorób autoimmunizacyjnych. Szacuje się, że stanowi ona przyczynę zaburzeń zdrowotnych około 1% ogółu populacji. Coraz częściej diagnozowana jest u osób dorosłych. Nowe zachorowania dotyczą w około 60% tej grupy, z czego 15-20% przypadków obejmuje osoby >60 roku życia. Patogeneza celiakii uwarunkowana jest wieloczynnikowo. Białka zbóż określane wspólną nazwą gluten stanowią ważny czynnik ujawniający obecność choroby trzewnej. Spożycie glutenu powoduje nieprawidłowe pobudzenie układu immunologicznego u osób predysponowanych genetycznie. Indukowany przez gluten układ immunologiczny sprawia, że proces atrofii przeważa nad procesami regeneracyjnymi w jelicie cienkim. To zaburzenie prowadzi do atrofii kosmków jelitowych. Jediną, akceptowaną powszechnie, metodą leczenia choroby trzewnej jest eliminacja glutenu z pożywienia. Prawidłowe postępowanie w chorobie trwającej całe życie oparte jest na ustawicznym zdobywaniu wiedzy i umiejętności pozwalających na poprawę jakości życia we wszystkich jego sferach.

Słowa kluczowe: gluten, choroba trzewna, biegunka, żywność bezglutenowa

Introduction

Celiac disease is a genetically determined abnormal immune response to gluten. This reaction causes damage to the villi of the small intestinal mucosa. Flattening the villi drastically reduces the intestinal surface, which is synonymous with the absorption impairment. After withdrawal of gluten from the diet, total intestinal regeneration occurs and the clinical symptoms of the disease disappear. The re-consumption of gluten leads to pathological changes in the intestine and the appearance of symptoms. The disease persists throughout life. Gluten is a common contractual name for mixtures of prolamin and gliadin proteins found in cereals. Symptoms are caused by the glutamine-soluble fraction belonging to prolamin. According to the FAO / WHO Codex Alimentarius, the name of gluten covers all the prolamins present in grains that are harmful to patients, in wheat - gliadin, in rye - secalin, barley - hordeina and oats - awenina [1]. Implementing Regulation of the European

Union Commission No. 828/14 of 30/07/2014 on the provision of information to consumers on the absence or reduced gluten content in food defines gluten as a 'protein fraction found in wheat, rye, barley, oats or in their cross varieties and their derivatives [...], which are insoluble in water or 0,5 M sodium chloride solution" [2].

Gluten intake causes abnormal stimulation of the immune system in genetically predisposed individuals. Gluten-induced immune system causes the atrophy process to prevail over the regenerative processes in the small intestine, resulting in atrophy of the intestinal villi. Flattening the villi causes a significant reduction in the absorption area, resulting in malnourishment of the body. Absorption disorders lead to the manifestation of various clinical symptoms (including diarrhoea with fatty stools, enlarged abdominal girth, weight loss, anemia).

Celiac disease is one of the most common autoimmune diseases. It is estimated that it is the cause of health disorders around 1% of the total population [3]. It occurs mainly in countries where grains containing gluten are a basic food product. The classical form of celiac disease, diagnosed on the basis of clinical symptoms, is less common in North America 1: 8000 than in Europe 1: 1000. The incidence of celiac disease in European countries varies considerably from 1: 330 in Sweden to 1: 4000 in Denmark. Large fluctuations in the occurrence of symptomatic celiac disease are also observed in Poland. Most often, it affects the residents of Silesia 1: 1000, and the least often people living in the area of Warsaw 1: 10000. The form of silent celiac disease detected by means of serological screening occurs with a much higher frequency of 1: 112 - 1: 500 [4]. Celiac disease ceased to be a domain of childhood. It is increasingly diagnosed in adults. New cases concern about 60% of this group, of which 15-20% of diagnoses include people > 60 years old [5,6].

Classification of the disease

The course of celiac disease varies considerably in terms of the type and severity of clinical symptoms, the degree of destruction of the small intestinal mucosa and the dynamics of the disease process [7,8]. The new disease classification distinguishes four clinical forms with varying clinical symptoms. From their lack in the form of a potential disease through subclinical and non-classical forms, to the classic form characterized by typical disorders of the digestive system [9]. Untreated celiac disease can lead to numerous complications from outside the digestive system [10].

The classic form, known as overt or full-blown, affects about 10% of all patients is most often observed in children. There are abdominal pains and bloating, fat or watery diarrhoea, weight

loss, weight loss, low growth, developmental disorders in children, change of mood, often depression, deficiency symptoms (eg persistent anemia) as a result of malabsorption syndrome. Due to the characteristic symptoms it is relatively easy to recognize, but the symptoms of celiac disease are often mistaken for, for example, symptoms of irritable bowel syndrome, food allergy or simple stress.

The non-classical form occurs most often. In the majority of patients, lesions occur only in the mucous membrane of the small intestine (sometimes aphthous mouth is the only symptom). Disease symptoms are the result of deficiency associated with impaired intestinal absorption. The most common are: unexplained iron deficiency anemia, elevated cholesterol level, aphthae and ulcerative stomatitis, hypoplasia of dental enamel, constant fatigue, neurological disorders (ataxia, epilepsy), persistent headaches, depression, early osteoporosis, bone and joint pain. There may be habitual miscarriages and fertility problems [11].

Subclinical form - it is detected as a result of screening. In these people, you can expect villi atrophy in the future and the full development of the disease. The absence of clinical symptoms does not exclude the existence of disease. In this form, the intestinal mucosal image is normal and antibodies are present in the blood.

The potential form of the disease is characterized by the occurrence of changes only at the genetic level. Presence of HLA-DQ2 or HLA-DQ8 (HLA- human leukocyte antigens) tissue compatibility antigens. The described clinical forms indicate that the severity of celiac disease can vary from mild weakness, bone pain, stomatitis to chronic diarrhoea and serious weight loss. Exacerbation of symptoms and manifestation of celiac disease may also be associated with pregnancy, infection, severe stress or surgery. Some diseases, seemingly not related to celiac disease, coexist closely with it, for example, autoimmune disorders. Their appearance may be related to the undiagnosed form of non-classical celiac disease.

Etiological factors

The pathogenesis of celiac disease is conditioned by many factors. The development of celiac disease depends on the interaction between three factors: the external, internal and genetic basis underlying the disease.

1. Genetic factor - it is the basis of celiac disease. People with coeliac disease inherit a specific haplotype of Class II tissue compatibility antigens (HLA); about 90-95% of patients with coeliac disease have HLA-DQ2 antigen and about 5-10% with HLA-DQ8 antigen. This is essential for the diagnosis of a potential form of visceral disease, but not sufficient for clinical signs [2].

2. Endogenous factor - the internal factor involved in the pathogenesis of celiac disease is tissue transglutaminase. This enzyme takes part in gliadin deamination. Deamidated gliadin peptides resulting from this process become more immunogenic. As a result of the immune response, antibodies against tissue transglutaminase and antibodies against deamidated gliadin peptides appear, which are the basic serological markers for the diagnosis and monitoring of visceral disease [12].
3. Exogenous factor - the external factor which is not able to cause the disease, but only to reveal its presence, is cereal protein called common gluten. It is a factor that induces a hyperactive response of the immune system in people with coeliac disease, resulting in damage to intestinal villi, impairment of absorption and occurrence of disease symptoms - a classic form of visceral disease. The elimination of this factor from the diet restores the proper functioning of the gastrointestinal tract. This means that gluten is an important factor revealing the clinical picture of visceral disease, and its elimination from the diet is the most important prophylactic effect of visceral disease.

Essential to the pathogenesis of the disease are environmental factors that significantly modify the genetic predisposition to the onset of celiac disease. One of the most important environmental factors is dysbiosis. The term 'intestinal dysbiosis' refers to the disturbance of the quantitative ratio of Gram positive to Gram negative strains of intestinal bacteria. Some bacteria isolated from the gastrointestinal tract of people with coeliac disease may be responsible for promoting the immunogenic effect of gluten. The changed composition of the intestinal bacterial flora in celiac disease refers to a reduction in the number of Bifidobacterium and Lactobacillus colonies with a simultaneous increase in the number of gram negative bacteria: Bacteroides, E. coli, Shigella and others [13,14]. Gastrointestinal flora disorders occur in people with visceral disease, regardless of whether or not they follow a diet eliminating gluten and regardless of the clinical activity of the disease [15]. However, it has not been determined whether dysbiosis is the cause or effect of celiac disease.

Gluten in food

Gluten contains mainly foodstuffs produced on the basis of cereal raw materials, derived from wheat, rye, barley and oats, such as: rolls, ordinary wheat-rye bread, wholemeal bread, crunchy bread, as well as groats (semolina, barley - Masurian, pearl, barley), pasta, bran and sprouts from these cereals. Gluten is therefore present in all products with these ingredients. In addition to the typical products derived from gluten cereals, it is also included in foodstuffs

containing even a small addition of cereal ingredients. Gluten cereal grains may be present in fermented dairy drinks; groats or grits in sausages, sausages and convenience foods; breadcrumbs in coated foods. A separate product group which may contain gluten is starch-containing products derived from gluten cereals. Such starches can be used as thickening agents in various sauces, lunch concentrates and yoghurts. Also, any products containing modified starches for which the source is not specified may contain gluten. Gluten is often found in products made from naturally gluten-free raw materials. Gluten contamination occurs during the cultivation of cereals or during food processing.

Naturally gluten-free products are: maize, rice, potatoes, soya beans, millet, buckwheat, tapioca, amaranth, manioc, lentils, beans, sorghum and all their preparations, nuts, as well as meat, fruit and vegetables. Products are also considered as gluten-free if, according to FAO/WHO findings, the gluten content does not exceed 20 ppm (20 mg per kg) and are marked with an international mark, the grain ear crossed out.

Products labelled as gluten-free are not always free of this type of protein. The study showed that nearly 20% of patients scrupulously following the recommendations of gluten-free diet had undesirable effects after consumption of labelled products [16]. The ubiquitous presence of gluten in processed or semi-processed foods and the high price of gluten-free foods are factors that can influence the nutritional behaviour of sick people. Studies have shown that these people consume insufficient portions of gluten-free cereals, dairy products, fruit, vegetables and seeds in relation to the healthy diet pyramid [17].

Elimination diet

The only commonly accepted method of treatment of visceral disease is the elimination of gluten from food. Other treatments (e. g. immunosuppressive treatment) are introduced in situations of unsatisfactory clinical, serological or histopathological improvement in the use of dietary treatment. Such situations concern mainly elderly people, in whom gluten elimination was not applied for many years of the disease duration, and above all HLA-DQ2 homozygotes [12].

Gluten-free diet for people with coeliac disease is an elimination diet, which must be applied throughout the patient's life. Therefore, it should be a balanced diet, varied in terms of products from different groups of foods and well accepted by the sick person. Consumed products can not contain gluten. The elimination diet is a restriction that an ill person does not easily accept. Therefore, taking into account the individual needs of patients in the

preparation of gluten-free diets is the basis for improving the quality of life of patients in the psychological, social and general spheres of satisfaction [18].

Society knows little about gluten and diseases dependent on it. The basis for acquiring this knowledge are websites. Unfortunately, the promotional role of medical staff is poorly evaluated in the research. Not many people know what gluten is and not many people know the basics of gluten-free diet [19]. Lack of public awareness is one of the reasons why people with coeliac disease do not follow dietary guidelines [20]. Meanwhile, therapeutic effects do not necessarily mean excluding the patient and his family from normal life activity. The key to achieving therapeutic success is to educate the family and the environment [21].

Summary

In view of the discussed problems and threats related to the dietary treatment of visceral disease and the knowledge of pro-health behaviours, educational activities and practical counseling addressed to parents of sick children and sick adults may be an extremely valuable initiative. Proper management of a lifelong disease is based on the continuous acquisition of knowledge and skills that improve the quality of life in all its spheres.

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