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REVIEW ARTICLE

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Gluten intolerance and Hashimoto thyroiditis: an integrated review

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Abstract

The advent of agriculture about 10,000 years ago enabled the massive and widespread use of grains containing gluten in food. Thus, it represented an evolutionary challenge that has not yet been overcome and created the conditions for the development of diseases related to exposure to gluten in humans. The so-called hypersensitivity involves any abnormal reaction resulting from eating a particular food. We are now looking at another interesting phenomenon that is causing great confusion among healthcare professionals. The number of individuals embracing a gluten-free diet appears far greater than the predicted number of celiac patients, fueling a global gluten-free product market approaching $2.5 billion (US) in global sales in 2010. This trend is supported by the notion that, along with celiac disease, other conditions related to gluten intake have emerged as health concerns. Hashimoto's Thyroiditis is an autoimmune disease and the most common cause of hypothyroidism in our environment. It occurs with high familial aggregation and there seems to be a clear genetic predisposition, with an apparent autosomal dominant inheritance of autoantibodies in affected individuals. Food intolerance and allergies and intestinal permeability can accompany hypothyroidism. Food (food intolerance and allergies), bacteria, viruses, chemicals, excess bacterial growth in the intestine, intestinal permeability, and contaminants are the main culprits for the autoimmune thyroid disease – Hashimoto's thyroiditis.

Keywords: Autoimmune diseases. Intestinal permeability. Food allergies. Food intolerances. Gluten intolerance. Hypothyroidism. Hashimoto's thyroiditis.

Introduction

Food intolerances are distinguished by a reaction of the body resulting from the deficiency in the digestive process of certain foods, and what may be healthy for one individual may cause illness in another [1]. Food allergies are more easily detected because when ingesting food, the body reacts with malaise, there are direct reactions in the immune system such as itchy skin, spots, suffocation, aggressive and noticeable reactions as soon as some food is ingested [1,2]. In terms of reactions resulting from food intolerances, they are confused with various symptoms, they have delayed consequences of certain substances in our metabolism, which lead to serious conditions because we continue self-intoxication for a long time and without the observation of this occurrence in our body, we continue to feel this or that discomfort without distinguishing the cause [3,4].

In this context, celiac disease (CD), previously understood as an allergy and intolerance to gluten, with predominantly gastrointestinal symptoms, is currently seen as an autoimmune disease, triggered by the ingestion of gluten. About 50% of individuals have gastrointestinal symptoms and the rest have other symptoms, such as depression, anxiety, chronic fatigue, infertility, amenorrhea, autoimmune hepatitis, among other manifestations [5]. It is also understood that CD is an enteropathy of genetic origin, characterized by permanent gluten intolerance. Specific and restrictive, the diet of celiac patients may present an increasing demand for products such as bread, pasta, sausages, and alcoholic beverages with special formulations [6].

In this sense, CD comes in three forms, classical, non-classical and asymptomatic. The first starts in the first years of life and presents symptoms of abdominal distension, irritability, reduction of subcutaneous cellular tissue, gluteal muscle atrophy, chronic diarrhea, vomiting, anorexia, and growth deficit [7]. The second is revealed later and has isolated manifestations, such as constipation,

problems with tooth enamel, arthralgia or arthritis, osteoporosis, sterility, short stature, iron deficiency anemia, and epilepsy associated with intracranial calcification. In the latter form, the disease is in latency, the individual does not show intestinal problems, however, he may develop the disease if he uses an excessive gluten diet [7].

Furthermore, gluten is included in the glycoprotein group of prolamines. Insoluble in water, gluten is responsible for the texture of pasta, cakes, and bread. It is also found in certain cereals, such as wheat, barley, oats, and rye, and can cause tissue damage in sensitive individuals, leading to disease [1]. CD demonstrates varied clinical features related to the intensity, extension, and location of the inflammatory process [2]. Other factors that influence the clinical picture are individual sensitivity, the amount of gluten in the diet, the timing of its introduction, and the protective consequence of breastfeeding. Gluten intolerance describes individuals who have symptoms and who may or may not have CD. These two terms are used to describe symptoms such as nausea, abdominal cramps, or diarrhea after gluten ingestion. Individuals with these symptoms should generally be advised against following a gluten-free diet without prior diagnostic investigation to exclude or confirm CD as there may be an underlying medical condition for which a gluten-free diet is not the treatment after a diet gluten-free for months or years, a CD is difficult to diagnose, and despite being a healthy way of eating, a gluten-free diet can be costly and restrictive [3].

In this sense, intestinal permeability results from an alteration in the intestinal mucosa, with the main characteristic of the increase in the space between the lining cells, with a consequent irritation of the mucosa or inflammation. In this way, foreign materials such as fungi, bacteria, and proteins penetrate more easily into the bloodstream. Another factor linked to intestinal permeability is dysbiosis, which is an imbalance in the intestinal flora [4,5]. In this scenario, Hashimoto's Thyroiditis or chronic lymphocytic thyroiditis is an autoimmune disease and the most common cause of hypothyroidism in our environment [1]. It occurs with high familial aggregation and there seems to be a clear genetic predisposition, with an apparent autosomal dominant inheritance of autoantibodies in affected individuals [3]. Food intolerance and allergies and intestinal permeability can accompany hypothyroidism [4].

Given the growing number of cases of gluten intolerance, this study aimed to relate intestinal permeability and consequent food allergies, emphasizing gluten intolerance as risk factors for Hashimoto's thyroiditis, reviewing the literature for epidemiological aspects, diagnoses, indications for treatment, and therapeutic procedure. Analyze information that indicates its complex characteristics, which require health professionals to have the necessary knowledge to identify its manifestation, resulting in a more efficient diagnosis.

Methods

The method used in this study was based on the research and analysis of published and available materials on the subject, considering articles in Portuguese and English, including books, reports, and specialized websites, highlighting the knowledge of Brazilian and foreign physicians in order to seek and integrate the various theoretical approaches in other areas of knowledge providing a convergence of knowledge. The databases of PubMed, Google Scholar, Scopus, Web of Science, and Scielo were consulted. A total of 40 articles were selected to compose this study.

Results and Discussion

The first action in nutrition is to remove gluten from daily foods. Gluten is a set of wheat proteins composed of gliadin and gluten. It constitutes 80% of wheat protein and is responsible for providing elasticity to bread dough. In reality, gluten is a source of health problems [1,2]. Gluten intake is correlated with intestinal permeability and the ease of production of autoantibodies by the immune system. This effect can produce Hashimoto's thyroiditis in addition to other autoimmune diseases [3]. Gluten weakens the intestinal villi and hinders the absorption of nutrients producing chronic diseases, gastrointestinal problems, and contributing to irritable bowel syndrome, which can be prevented by eliminating gluten from the diet. Gluten negatively affects the health of the entire human population to a greater or lesser extent, and more negatively to celiac patients [4].

In this sense, celiac disease is associated with thyroid disease. This result was obtained through a clinical trial with 68,068 individuals of which 14,021 were celiac. There is a higher frequency of hypothyroidism and antithyroid antibodies (Hashimoto) in patients with celiac disease, so not ingesting products with gluten can normalize subclinical hypothyroidism. 11% of celiac patients have antithyroid antibodies that tend to disappear on a gluten diet. Celiac disease and autoimmune thyroiditis (Hashimoto) are more frequently produced in children and adolescents with type 1 diabetes. Definitely, Hashimoto's thyroiditis is strongly related to celiac disease [8].

Throughout evolution, human gene expression has not been primed to properly digest gluten, as wheat has appeared in the last few thousand years and gene expression cannot change that fast in a population. The negative effect of gluten on health is so important that antibodies against gluten are even detected in patients with multiple sclerosis, and multiple sclerosis and Hashimoto's thyroiditis are autoimmune diseases [9-12].

Some bacterial toxins, viruses, and partially digested foods, all of which are associated with excess bacterial growth in the gut and intestinal permeability, can enter the blood through the intestinal barrier and act as antigens and thus stimulate the production of autoantibodies against the thyroid producing Hashimoto's thyroiditis [13]. To this process, it is necessary to add the negative effect of peroxynitrite that occurs in the absence of antioxidant foods, the environmental contaminants [14].

Also, in the intestine, there are more than 30,000 species of bacteria. Some bacterial toxins, viruses, and partially digested foods are antigens that can cross the intestinal barrier. This situation produces inadequate nutrition. Poor nutrition can increase bacterial growth in the gut and intestinal permeability [15]. When this occurs, bacteria, viruses, toxins, and partially digested foods, all of which are antigenic, can cross the intestinal barrier and enter the bloodstream. With these conditions, lymphocytes recognize how foreign to these antigens circulating in the blood produce antibodies against them. Due to the existence of homologies between the circulating antigens with the thyroid cell membranes, some antibodies bind to them, harming the thyroid. By defending the body from aggression, lymphocytes can produce autoimmunity in other organs of the body, including the thyroid [16-20].

Besides, intestinal permeability is found in many serious clinical situations and common disorders such as irritable bowel syndrome [21]. Under these conditions, very large bacteria and molecules, which are normally unable to cross the barrier of the intestinal epithelium, can enter the bloodstream and produce disease. In the blood, these molecules act as antigens and induce lymphocytes to produce antibodies against them. When some of them show homologies with the thyroid – similar molecules – the antibodies also attack the thyroid, including other organs. They can also produce chronic inflammation and food allergy [22-25].

In healthy individuals, gastrointestinal motility prevents the overgrowth of bacteria in the small intestine, so a small change in intestinal motility is one of the risk factors for the development of bacterial overgrowth in the intestine [26]. Intestinal bacterial overgrowth produces bowel bloating and intestinal problems, and is present in more than half of patients with hypothyroidism and implements the likelihood of generalized inflammation, gastric problems, intestinal permeability, and Hashimoto's thyroiditis [27].

In this aspect, Hashimoto's thyroiditis is also associated with intestinal motility disorder that presents as dysphagia or stomach burning, probably due to the production of auto-antibodies responsible for the autoimmune process against the thyroid, whose mechanism is related to the antigen homology [28-30]. In this context, the human population in the industrialized world is exposed to complex mixtures of persistent contaminants that contaminate food, water, and air. Low doses of contaminants that act persistently over time can alter the thyroid [31].

Epigenetics studies the non-genetic factors - same DNA, but a different expression of genes – that interfere in the development of an organism. Epigenetics explains almost all health and disease processes. It is possible to reverse autoimmune thyroiditis, if not completely, at least partially with epigenetic nutrition that also includes food supplements. This requires reversing mitochondrial inactivity, reducing stress and homocysteine, adjusting sex hormones, balancing estrogens with sex hormones, reducing obesity, taking vitamins, minerals, melatonin, and modifying diet [32-34].

The Mediterranean diet and frugal food are the most advisable to reduce bacterial overgrowth and bowel permeability. Therefore, food (food intolerance and allergies), bacteria, viruses, chemicals, excess bacterial growth in the intestine, intestinal permeability, and contaminants are mainly responsible for autoimmune thyroid disease - Hashimoto's thyroiditis [35]. The only plausible and efficient treatment for CD, in all clinical forms, is nutritional, and gluten should be eliminated from the individual's diet throughout his life, thus leading to the remission of symptoms and restoration of the normal mucosal morphology. The severity of the illness will depend on the age of presentation and the time that elapses until diagnosis and treatment. For this reason and to avoid serious forms, it is recommended to postpone the introduction of gluten in all young children until at least six months of age. In patients with gluten intolerance, this protein found in the foods mentioned above is eliminated from the diet [36].

Following a gluten-free diet can be time-consuming and seems complicated. However, once celiac disease (CD) is diagnosed, patients have various types of assistance and help. A qualified nutritionist can help you select the most appropriate foods and organize a balanced, tasty diet that suits your lifestyle.

Some lists contain up-to-date information on elaborated products that do not contain gluten and can be included in the diet without any problems. In many countries, there are official celiac associations, which are national support groups as well as a source of privileged information about all aspects related to the disease [37].

One of the characteristics of hypothyroidism is its ability to reduce esophageal and gastric motor activity and thus a feedback process can be produced. The thyroid functions poorly due to inadequate nutrition that alters intestinal motility, producing bacterial overgrowth which, in turn, acts negatively on the thyroid. A vicious circle [38]. Hashimoto's thyroiditis is an autoimmune disease produced by lymphocyte antibodies to defend the body from foreign agents, also called antigens, such as bacterial toxins, viruses, and partially digested food. Since some of these agents share homologies – the same molecular structures – as the thyroid, some of these antibodies attack the thyroid producing Hashimoto's autoimmune thyroiditis [39].

This mechanism is closely correlated with bacterial overgrowth in the gut and intestinal permeability. In addition, food (food intolerance and allergies), environmental contamination, the production of peroxynitrite due to a lack of antioxidants and even transgenerational epigenetics not yet investigated, complete the map of autoimmune thyroiditis, being the main responsible for the autoimmune thyroid disease - thyroiditis of Hashimoto. Regardless of the pharmacological treatment proposed by the physician, it is also recommended to investigate lifestyle, one of the basic mechanisms responsible for autoimmune thyroiditis [40].

Conclusion

Celiac disease is characterized by a total and permanent intolerance to gluten. It is a disorder of the small intestine caused by a complex immune response to gluten. Gluten is a reserve protein found in wheat and other cereals such as rye, barley, and oats. The onset of the disease usually occurs between six months to two years after the introduction of these cereals in the diet. Celiac Disease gives rise to some symptoms of weakness, however affected individuals can fully recover if they follow a proper gluten-free diet. Gluten in food damages the lining of the small intestine, which in turn prevents the body from properly digesting and absorbing food, resulting in chronic malnutrition, deficiency in calories, and special nutrients such as protein, vitamins, and minerals. The pathogenesis of celiac disease is multifactorial and presents a varied clinical picture, in which symptoms of malabsorption and malnutrition predominate. Individuals may have one or more of some conditions associated with celiac disease: anemia, generalized fatigue, weight loss or growth failure, osteoporosis, vitamin or mineral deficiencies, and (albeit rare) gastrointestinal malignancy. The diagnosis of celiac disease is performed through a combination of clinical, laboratory, and histological findings, and the general pattern of symptoms and family history of individuals with suspected celiac disease should be evaluated, with small bowel biopsy being the gold standard for diagnosis.

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