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Celiac disease and gluten-free diet – a review article

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ABSTRACT

Celiac disease is identified by injury to mucosa of small intestine, triggered by gluten and can be characterised by malabsorption of nutrients in the susceptible individuals. It is supposed to be a common auto-immune disorder affecting almost every part of the world population. The strict withdrawal of gluten from diet has been considered to be the only treatment. Earlier it was thought to be more common in young children leading to ignorance of the fact that this may result into severe condition when these children grow older. Even in India it has been there for a long time, mainly observed in the northern population. Lack of knowledge and awareness leads to improper diagnosis and treatment failure in many parts of the world.

ETIOLOGY OF THE DISEASE

The most common cause of the disease is malabsorption of vitamins and micronutrients. The chronic malabsorption may result from injury to the small intestine leading to the loss of surface area for absorption, reduction of digestive enzymes and impaired absorption of micronutrients such as fat-soluble vitamins, iron and folic acid. [1, 2] Celiac disease can be characterized by the primary gastrointestinal symptoms with the malabsorption such as chronic diarrhea, abdominal pain, distention, and weight loss [3] and extra-intestinal manifestations include delayed puberty, short stature, treatment resistant ferropenic anemia and frequent mood alterations . [3, 4]

NUTRITIONAL DEFICIENCY

Impaired absorption of nutrients in intestine frequently affects CD. According to the studies, more than half of celiac patients have low levels of elastase-1 in their stools, a marker of exocrine pancreatic function. [5] Frequently seen is the malabsorption of calcium, iron and folic acid as they are absorbed in the first section of intestine whereas different sections are affected by deficiency of vitamin B12. Vitamin D and Calcium deficiencies may be due to number of mechanism which include its malabsorption or due to lactose intolerance. [4] Vitamin K deficiency is also shown in few patients with celiac disease and thus it is rectified before the biopsy. Celiac patients also suffer from deficiencies of Vitamin B6, selenium, copper and zinc. [6]

FOOD CONSUMPTION

The data says celiac disease can be induced by the exposure to gluten by the intake of foods such as wheat, barley, rye including infant cereals, zwieback, breads, crackers, tortillas, teething biscuits, cookies, cakes, and pastas. [7] The autoimmune mechanism is initiated by the storage protein called prolamins present in wheat, rye and barley. [8]

Exposure of gluten in the first 3 months of the life makes the child prone to CD. [7] The CD patients are strictly recommended to go for a gluten-free diet and more favourably encouraged for the intake of oats. Oats don't yield gliadin but contains avenin. [9] It is found that there is more content of prolamins in wheat and barley as compared to oats for which it is considered to be safe for intake by the CD patients. [10]

Treatment and failure to adhere to the treatment

Since the treatment is primarily based on strict restriction to exposure of gluten, it is often observed that withdrawal of gluten from diet leads to reduced quality of life. The CD patients recommended for GFD (Gluten-Free Diet) results in epithelial healing and the gradual reformation of intestinal villi. [11] It is necessary to remove gluten from diet by two processes: either by elimination of products containing wheat, barley, spelt, rye and oats or by elimination of any product derived from the above cereals, food products, beverages and medication. [12, 13]

Various factors lead to the failure of GFD such as contamination of other food products with gluten, inefficient to purchase expensive gluten free products, food intolerances, inability to follow the diet outside home, mood and stress. [14] In India, CD was first described in the 1960s in children by Walia et al. [15] and in adults by Misra et al. [16] Northern parts of the country shows more cases of celiac disease in comparison with the southern areas which may be due to the diet habits of the population which varies from the intake of wheat and barley to the consumption of rice at the respective places. [16]

DIAGNOSIS AND TYPES OF CD

If the diagnostic criteria chosen is classic symptoms like diarrhea and short stature, the

presence of the disease may be rare. Approximately 90% of patients with CD carry the HLA-DQ2 heterodimer encoded by the HLA-DQA1*05 and DQB1*02 genes. They have at least one copy of extended HLADR3-DQ2 haplotype, this makes CD common with many other autoimmune diseases. [17] The first degree family members of CD patients are more prone to be affected. The precise risk is highest in monozygous twins, next in siblings, and then finally parents and children of CD patients. [1] The disease often affects the other parts of the body and reduces the life span. Patients are often suggested to evaluate the common coexisting autoimmune conditions, such as thyroid and liver diseases [3]

Non responsive celiac disease (NRCD)-The unwavering or periodic symptoms and signs even after 12 months of treatment with Gluten-free diet. [17,18,19,20] The most common causes of NRCD are related to diet, purposeful or inadvertent gluten ingestion.[20] Refractory celiac disease [RCD]-unwavering or periodic small intestine villous atrophy with malabsorption even after treatment with GFD. The symptoms of primary clinical manifestations in patients with NRCD increases the risk for RCD. This can be treated with non-dietary therapy such as local or systemic corticosteroids and immune modulators.

Gluten: the inducer of CD

Wheat is the staple food of the northern population in India, which is less consumed by the southern population. The gluten present in wheat is a constituent which is viscoelastic in nature and which remains even after washing. It can be defined as a mixture of gliadin (alcohol-soluble monomers) and glutenins (alcohol-insoluble, polymers). [21] The alcohol soluble part is the major component considered harmful for Celiac Disease. Therefore, wheat intake is reduced or stopped in CD patients.

Various environmental factors are also considered to cause or increase the risk of CD. In infants the amount and timing of gluten given and other infections also affects the risk for CD. Breastfeeding provides protection, especially while the infant is exposed to gluten containing diet.

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