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IRON DEFICIENCY, ANEMIA AND QUALITY OF LIFE OF CELIAC DISEASE PATIENTS - REVIEW

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ABSTRACT

Introduction

Celiac Disease (CD) is a chronic autoimmune disease that causes damage to the small intestine in reaction to a specific protein - gluten. One of the most common complications of CD is iron deficiency, which leads to anemia. Iron deficiency anemia (IDA) has a significant effect on a patient's health, both physical and mental, vastly impairing quality of life. This paper provides mechanisms leading to iron deficiency and its impact on the development of the IDA; clinical symptoms, diagnostics, and treatment of iron deficiency. It also highlights the importance of early diagnosis and the necessity of strictly following a gluten-free diet.

Materials and Methods

This review uses resources available in the PubMed and Google Scholar databases. A thorough search of English-language articles involved key terms: „celiac disease", „iron deficiency", „iron deficiency anemia", „gluten-free diet", „quality of life". The information obtained through these searches has been compiled and examined.

Results

Research indicates that iron deficiency anemia is a prevalent complication in patients with CD. In case of a non-responsive form of IDA, it is important to exclude the possibility of CD. Once CD with IDA is detected, restoring iron stores to the desired level, as well as implementing a gluten-free diet on a permanent basis is required.

Conclusions

Studies show the close connection between CD, IDA, and the impaired quality of patients' lives, emphasizing the role of early diagnosis and subsequent implementation of a gluten-free diet. Further interdisciplinary research on methods of diagnosis and treatment are vital for the advancement of medical care and the well-being of patients.

KEYWORDS

Celiac Disease, Anemia, Iron Deficiency, Quality of Life, Gluten-Free Diet

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Introduction

Iron is a crucial element in the human body - it plays a key role in processes such as erythropoiesis, electron transport chain, synthesis of neurotransmitters, and as a component of myoglobin as well as various enzymes involved in mitochondrial respiratory chain or DNA synthesis (Muñoz, Villar & García-Erce, 2009). It is believed that iron deficiency accounts for the majority of cases of element deficiencies - even up to 2 billion people may be affected by it, including in highly developed countries (Montoro-Huguet, Santolaria-Piedrafita, Cañamares-Orbis & García-Erce, 2021). Given these estimates, iron deficiency anemia (IDA) represents a common challenge for healthcare providers, affecting both pediatric and older patient populations.

There are two spikes of prevalence in pediatric populations: it is estimated that the prevalence of IDA in Western countries stands at 2.3-15% (between the first and the third year of life), and 3.5-13% in males and 11-33% in females during adolescence - in contrast to adult patients: less than 1% in men under 50 years of age, 2 to 4% in men over 50 years of age, 9 to 20% in teenagers after menarche, and 5 to 7% in women after menopause (Talarico, Giancotti, Mazza, Miniero & Bertini, 2021).

IDA is marked by a reduced number of erythrocytes and hemoglobin, which can be responsible for decreasing the quality of life: weakness, fatigue, decreased physical efficiency, impaired concentration, and attention. Given these impacts on health, recognizing the causes of IDA is essential for understanding and improving the effectiveness of patient treatment.

In this article, Celiac Disease (CD) is primarily studied as one of the more common causes of IDA. CD is a chronic autoimmune illness that results in damaging the small intestine's mucosa following the ingestion of gluten in predisposed individuals. Gluten is a protein present in the vast majority of everyday food - wheat, rye, barley, and oats. Consequently, it comes to the malabsorption of nutrients, including iron, which leads to its deficiency. In Europe and North America, the frequency of CD is estimated at 0.5 - 2% depending on the study (Ben Houmich & Admou, 2021; Kurppa, Collin, Mäki & Kaukinen, 2011). The rising number of CD patients appears to reflect an actual increase in incidence rather than solely improved diagnostic awareness (Martín-Masot et al, 2019). IDA is often the only symptom of CD, particularly in the subclinical form of CD (Talarico, 2011; Martín-Masot et al, 2019).

Understanding the link between CD and IDA is crucial for early diagnosis and effective treatment. The objective of this study is to review the literature on the topic of CD, its complications such as IDA, health impact, and management.

Methodology

This review uses resources available in the PubMed and Google Scholar databases. A thorough search of English-language articles involved key terms: „celiac disease", „iron deficiency", „iron deficiency anemia", „gluten-free diet", „quality of life". The information obtained through these searches has been compiled and examined.

Results

Analysis of accessible literature shows that CD is an often encountered etiology of IDA. Depending on the population undergoing studies, the prevalence of CD amongst IDA patients varies between 3% and 15% (Talarico, 2021; Mahadev et al, 2018). Considering that anemia is frequently the sole manifestation of CD, it can lead to a delay in diagnosis. The delay in proper diagnosis ranges between months to many years, on average 9.7 years from the first symptoms (Norström, Lindholm, Sandström, Nordyke & Ivarsson, 2011). In many cases, patients are initially treated only with iron supplementation, without causal diagnosis (Jimenez, Kulnigg-Dabsch & Gasche, 2015).

Studies show that the main mechanism leading to anemia and nutrient deficiency secondary to CD is the impairment of duodenal mucosa connected with reduced absorptive surface (Freeman, 2015). The presence of gluten causes chronic inflammation, which can also affect metabolic dysfunctions (Starchl, Scherkl & Amrein, 2021). Gluten-free diet often leads to recovery from iron deficiency anemia, even without supplementation of iron (Annibale et al, 2001). However, restoring iron levels may need supplementation for a substantial period (6 to 12 months) following restoration of small interstinal mucose (Caruso, Pallone, Stasi, Romeo & Monteleone, 2013).

The literature review suggests the need for screening for CD in patients with IDA of unknown origin, particularly when iron deficiency persists despite supplementation or in the presence of additional symptoms such as gastrointestinal symptoms (diarrhea, bloating, gas, constipation, nausea, etc.), weight loss, or autoimmune diseases (Singh, Singh, Ahuja & Makharia, 2022).

Untreated CD and IDA can profoundly decrease the quality of patients' lives. Individuals affected by these conditions commonly experience chronic fatigue, general weakness, and impaired concentration. Certain studies show that patients with CD may even present symptoms of anxiety and depression, which additionally affects activities of daily living and social interactions (Nachman et al, 2009). Early and accurate diagnosis can considerably improve people's quality of life, leading to normalization of laboratory results and alleviation of symptoms.

Discussion

The association between IDA and CD is compound and multifactorial. This review highlights several key observations and its implications on clinical approach and future research.

CD is the pivotal cause of IDA, with an occurrence rate of up to 15%. This draws attention to the relevance of including CD in the differential diagnostic process, amongst such causes as pregnancy, menstruation, peptic ulcer disease, drugs, and other inflammatory states with malabsorption (Massey, 1992). Nevertheless, frequently, the subclinical course of CD results in deferred diagnosis, thus progression of symptoms and deterioration of both physical and mental health.

Gluten in individuals with CD is the component stimulated by the enzyme tissue transglutamiase, which augments immunogenicity and promotes the production of pro-inflammatory factors (Green, Lebwohl & Greywoode, 2015). The fundamental treatment of CD is a gluten-free diet. Difficulties in adhering to a gluten-free diet include, among other things, inadequate knowledge of CD and dietary exclusions, issues with the availability of gluten-free alternatives of e.g. bakery products and pasta, or insufficient support from relatives and friends (Olsson, Hörnell, Ivarsson & Sydner, 2008). However, some patients continue to have IDA even after implementing a gluten-free diet (Stefanelli, Viscido, Longo, Magistroni & Latella, 2020). The persistence of IDA should be further examined, including the assessment of the patient's compliance, unintentional intake of gluten-contaminated food, inadequate dietary iron intake, continuous damage of mucosa, as well as non-dietary and non-celiac causes.

The influence of unrecognized CD and associated with it IDA is significant. Correct diagnosis and implementing a gluten-free diet results in improvement of quality of life. Studies show the positive impact gluten-free diet has on patient well-being, both in those with symptoms, as well as in individuals without visible manifestations of CD (Mustalahti et al, 2002).

Conclusions

The evidence validates a significant correlation between CD and IDA, as well as decreased quality of life. CD is often overlooked as a cause of inexplicable anemia, which can result in the postponement of beginning therapy, affecting physical and mental health. A gluten-free diet is the only efficacious treatment of CD for the moment, providing improvement of parameters and symptoms, hence the quality of life. Nevertheless, the challenges of a gluten-free diet can affect longtime efficacy. The multidisciplinary approach to patient care and early diagnostic of CD in patients with IDA without known cause plays a vital role. Future studies should be conducted and targeted on the refinement of techniques of prompt detection of CD and expanding availability and increasing adherence to gluten-free diet.

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Author's contribution

Research concept and design – Kinga Kosiec-Stolarek, Iga Kwiecień, Jakub Jędrychowski, Julia Kaszucka, Małgorzata Krzyżanowska.

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