SUMMARY

Celiac disease is a systemic autoimmune disorder that occurs after exposure to gluten and related prolamins in genetically predisposed individuals. It is characterized by a variety of clinical symptoms, the presence of specific serum antibodies, HLA-DQ2 and/or HLA-DQ8 haplotypes, and enteropathy. The clinical symptoms of celiac disease are diverse and can affect both the gastrointestinal tract and other organs. For this life-long disease the only effective treatment is strict adherence to a gluten-free diet. In recent years, there has been an increase in the frequency of extraintestinal symptoms of celiac disease, indicating that they occur in about 60% of children. Among these are ocular manifestations, affecting structures of the anterior and posterior segments of the eye. It is believed that they may result from impaired absorption of nutrients and circulating antibodies and immune complexes in ocular tissues.

The aim of the study was to evaluate the frequency of changes in selected ophthalmic parameters in children and adolescents with celiac disease. An attempt was made to determine whether the duration of a gluten-free diet affects the occurrence of ocular changes. The relationship between laboratory test results and abnormalities in eye examinations was also investigated.

A total of 125 individuals, aged 6 to 18 years, were analyzed. The study group included 62 individuals with an average age of 12 ± 3.38 years. In this group, celiac disease was diagnosed based on the ESPGHAN guidelines in effect at the time of diagnosis (criteria from 2012 or 2020), after excluding diseases that were criteria for exclusion from the study. The control group consisted of 63 individuals with an average age of 11.4 ± 3.33 years, on a gluten-containing diet, without inflammations, surgeries, and eye injuries in their history, as well as organic disorders, chronic diseases, or conditions that could affect the eye. Celiac disease was excluded based on serological tests. The groups did not differ significantly in terms of sex and age. The research was conducted from 2021 to 2023 in Pediatric Gastroenterological Outpatient Clinic for Children at the University Hospital No. 1 and at the Ophthalmology and Optometry Clinic at the University Hospital No. 2 in Bydgoszcz, after obtaining the consent of the Bioethics Committee at the Nicolaus Copernicus University in Toruń, Collegium Medicum. The analysis used the data obtained from the right eye. Statistical calculations were compiled

using Microsoft Office Excel 2019 and Statistica 13 TIBCO 2 Software Inc. The level of significance was set at $p<0.05$.

It was demonstrated that there are significant differences between the study and control groups in the average serum concentration of ferritin, folic acid, and FT3. A significantly lower contrast sensitivity and anterior chamber depth were found in children and adolescents with celiac disease. In the remaining measured ophthalmological parameters, no differences were observed between patients with celiac disease and the control group. The duration of the gluten-free diet significantly affected the concentration of vitamin B12, folic acid, and hemoglobin in the serum, as well as the results of central corneal thickness (CCT) and peripapillary retinal nerve fiber layer (RNFL) thickness in the upper quadrant. Furthermore, a negative correlation was shown between the results of peripapillary RNFL thickness in the nasal quadrant and macular RNFL thickness with the concentration of IgA antibodies against tissue transglutaminase. A positive correlation was noted between some of the ocular parameters and the concentration of ferritin and folic acid in the blood.

The conducted studies showed that the occurrence of celiac disease has a low impact on the anatomy and functioning of the eye in children and adolescents. Some of the examined parameters (CCT and peripapillary RNFL thickness in the upper quadrant) may depend on the duration of the gluten-free diet in patients. Changes in some ophthalmic parameters may be related to deficiencies in nutrients in patients with celiac disease.