

## Summary.

The analysis of studies assessing the nutritional status of chronically ill children, indicates the prevalence of eating disorders both during hospitalization and in outpatient care. Duration, form of the disease or treatment regimen used can aggravate the above mentioned condition to a great extent. Particular attention should be paid to autoimmune disorders. Various mechanisms involved in the pathogenesis of auto-aggression can lead to chronic malnutrition, overweight or obesity in a long term perspective. Selection of appropriate research methods and tools is essential in screening and in-depth assessment. Identification of patients at risk for disorders of nutritional status and implementation of adequate measures can prevent its serious consequences. The main objective of the study was to assess the nutritional status and body composition of children with selected autoimmune diseases using anthropometric and bioimpedance indicators. A variety of measurement tools were used in the study: bioelectrical impedance analyzer BIA - 101 (tetrapolar contralateral system, the test current amplitude of 800 uA, sinusoidal, 50kHz), medical scales, stadiometer. In addition, the indicators (BMI, WMC, Cole), centile charts (Palczewska and Niedźwiedzka the 2001 WMC body mass index, centile charts of body composition Wells et al., From 2012) were used.

The results of measurement were transferred to specialized computer software (Bodygram1\_31 by AKERN) and to the author's research questionnaire. The study was conducted during the period from March 2012 to August 2014. It was preceded by a month pilot study. The study included 248 children with (celiac disease-51, UC-34, with CD-25, diabetes-138) aged 4-18 years hospitalized at the Clinical Department of Pediatrics with Pediatric Neurology Unit of the Provincial Hospital No. 2 in Rzeszów. The test group also included children continuing treatment at the Specialized Pediatric Outpatient Clinic at the Provincial Hospital No. 2 in Rzeszów. The control group consisted of 235 children without autoimmune disorders attending randomly selected primary schools, junior high schools and high schools in rural and urban areas in the Podkarpacie province. The trial design was awarded a positive opinion of the Bioethical Committee of the University of Rzeszów (Resolution No. 05/02/2012).

Initially, the analysis was conducted on 100 children with newly diagnosed autoimmune disease. 100 healthy children to match them in terms of gender and age (age- and sex matched controls) were assigned at random. Among the children with newly diagnosed autoimmune disease in the test group, the largest proportion constituted children with type 1 diabetes (63 patients). This group also included children with inflammatory bowel diseases - 26.0% (UC 16 people and with CD: 10) and celiac disease (11 patients). Apart from nutritional status analysis in newly diagnosed children, the rest of the sick children were also examined to evaluate such factors as disease activity (UC, CD), a gluten-free diet (celiac disease), duration of disease, method of treatment, metabolic control (diabetes type 1). The influence of above mentioned factors on selected components of body composition (FM, FFM, BCM, MM, TBW) was analyzed. The study also evaluated the correlation of selected indicators of nutritional status (BMI, WMC, Cole) to fat mass, fat free mass and FMI and FFMI indicators.

Disorders of the nutritional status occurred in 31% of newly diagnosed children (underweight 18% vs. 13% overweight / obesity). The average percentage of BCM and MM were significantly lower in the test group than in the control group (BCM = 47.82% vs. 52.04%; MM = 46.24% vs. 50.20%). In children with CD lower values of fat free mass ( $p = 0.0477$ ) and its components: cell mass ( $p = 0.0061$ ), muscle ( $p = 0.0076$ ) and total body water ( $p = 0.0487$ ) were observed. A statistically significant positive correlation between FM vs BMI ( $r = 0.878$ ), FFM vs WMC ( $r = 0.873$ ), FMI vs Cole ( $r = 0.820$ ) and FFMI vs WMC ( $r = 0.803$ ) was demonstrated in the group of newly diagnosed children. In children with newly diagnosed celiac disease, after a year of gluten-free diet, a statistically significant increase in all components of fat free body mass was observed ( $p < 0.05$ ). Lower FFM values were observed in children with active IBD (UC: 13.6% <2.3 percentile, 22.7% <25 percentile vs CD 22.2% <2.3 percentile, 33.3% <9, 2 percentile) in comparison to the children in remission phase (UC: 0.0% <2.3 percentile, 8.3% <25 percentile vs CD 14.3% <2.3 percentile, 14.3% <9.2 percentile). Children with newly diagnosed type 1 diabetes were characterized by a lower value of the FFM (mainly BCM [ $p = 0.0060$ ] and MM [ $p = 0.0068$ ]). No statistically significant difference in body composition depending on the method of insulin delivery as well as metabolic control was observed in the present study.

## **Conclusions:**

1. Disorders of nutritional status, underweight or excess body weight were observed in 31% of children with newly diagnosed autoimmune disease.
2. In the test group, the most negative impact on the nutritional status and fat-free body mass values was found in children with Crohn's disease.
3. The decrease in disease activity in children with inflammatory bowel disease was associated with an improvement in their nutritional status which was reflected as improvement in the parameters of body fat mass and fat-free mass.
4. The gluten free diet in children with celiac disease had a positive impact on their nutritional status which was expressed as the improvement of fat-free body mass parameters.
5. Significantly reduced body cell mass (BCM) and muscle mass (MM) were found in children with type 1 diabetes at diagnosis. Gradual improvement in these parameters of the nutritional status of these parameters was observed in course of treatment.
6. The method of insulin administration had no significant impact on the nutritional status of children with type 1 diabetes.
7. There is a positive correlation between the results of fat-free mass (FFM) obtained with bioimpedance and body mass index by Książyk (WMC). In case measurements by means of bioimpedance cannot be conducted, body mass index by Książyk (WMC) can be applied to estimate changes in fat-free mass.
8. There is a positive correlation between the results of body fat mass (FM) obtained with bioimpedance and body mass index (BMI). In case measurements by means of bioimpedance cannot be conducted, body mass index (BMI) can be applied to estimate changes in body fat mass.
9. Bioimpedance analysis (BIA) is a simple device to assess body composition and nutritional status, it is worthy spreading and using in everyday clinical practice