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Metabolic Bone Disorders in Children with Inflammatory Bowel Diseases

Introduction

IBD is common in children, with an increasing incidence of Crohn's disease in the pediatric population, including infants, with an unknown cause. Although similar to adults, children with IBD are at a higher risk of developing growth retardation and extra-intestinal manifestations. They also frequently suffer from anemia, malabsorption, and vitamin deficiencies that affect bone metabolism, especially during adolescence when skeletal development is at a crucial time.

My project aims to assess the impact of IBD and its treatment on bone metabolism in children under 18 hospitalized at the Polish Mother's Health Center in Łódź. I will evaluate densitometric parameters, calcium-phosphate metabolism, biochemical markers of bone turnover and blood to understand the disease's effects on bone development. I will also include a control group of patients without diagnosed IBD.

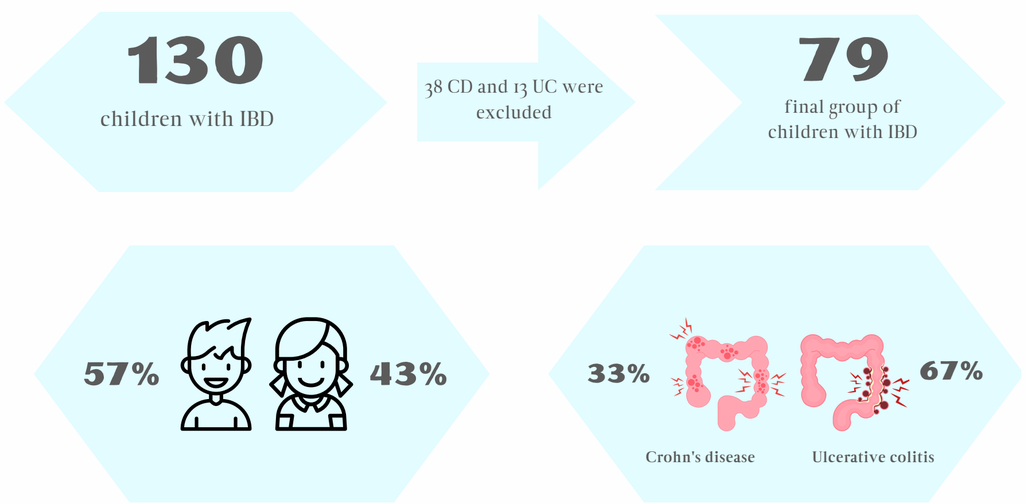


Figure 2. Characteristics of study group

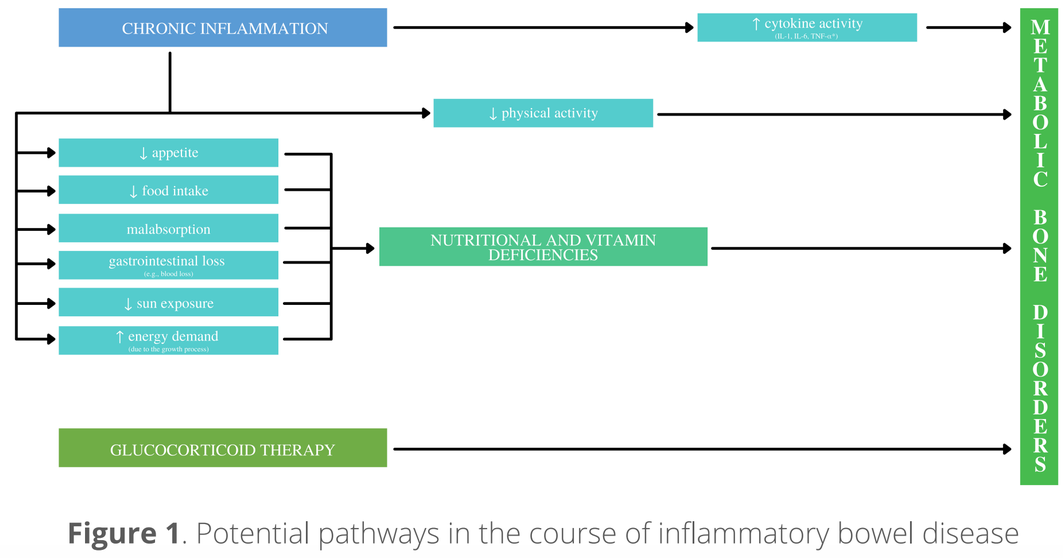


Figure 1. Potential pathways in the course of inflammatory bowel disease leading to metabolic bone disorders in children.

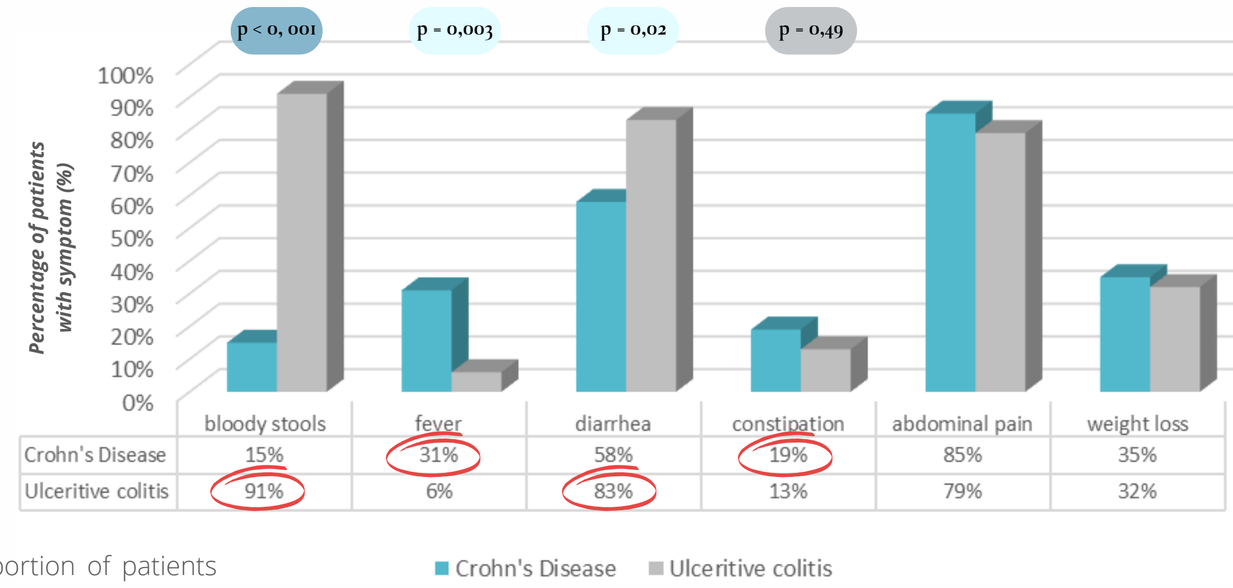
Methodology

Pediatric patients with inflammatory bowel disease undergo DXA for bone density and physical development assessment. Biochemical parameters will be analyzed during subsequent hospitalizations and compared based on age, disease stage, and treatment method. The study aims to identify bone metabolism disorders' frequency and correlated parameters in these patients.

During the current academic year, a retrospective analysis of 130 hospitalized patients over the past 4 years was conducted to study IBD. Gastrointestinal and extraintestinal manifestations were recorded, and data from subsequent hospitalizations were used for some lab tests. 38 CD and 13 UC patients were excluded due to various reasons, leaving a study group of 79 patients, with 32.9% CD and 67.1% UC. Boys accounted for 57% (n = 45) of the study group, while girls for 43% (n = 34).

Results

The study found that patients with Crohn's disease (CD) and ulcerative colitis (UC) presented with different symptoms at the time of diagnosis. CD patients were more likely to experience fever, constipation, while UC patients were more likely to have bloody stools and diarrhea. Abdominal pain and weight loss were common symptoms in both groups.



	bloody stools	fever	diarrhea	constipation	abdominal pain	weight loss
Crohn's Disease	15%	31%	58%	19%	85%	35%
Ulceritive colitis	91%	6%	83%	13%	79%	32%

Figure 3. Comparison of symptoms between Crohn's Disease and Ulcerative Colitis Patients at Diagnosis

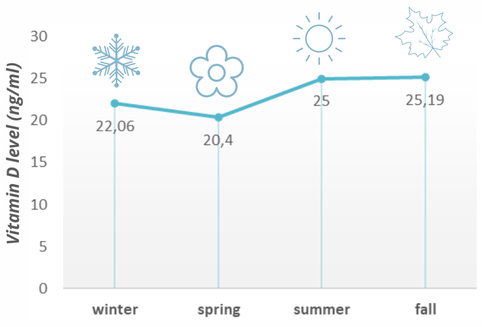
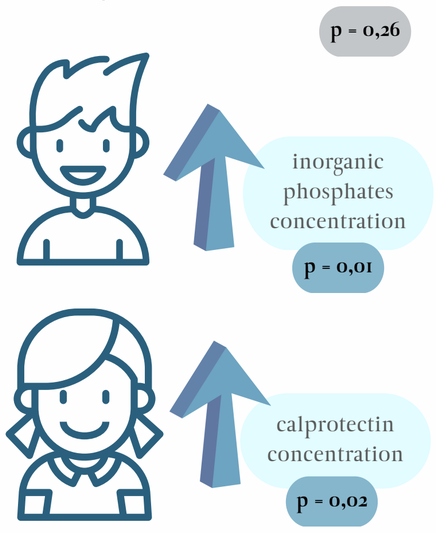


Figure 4. Vitamin D concentration according to the season of measurement

78%
insufficient vitamin D concentration

68%
without densitometry

Bone density testing was not performed in a significant proportion of patients and many patients had low concentration of vitamin D. CD patients had higher CRP values and gender differences were observed in inorganic phosphates and calprotectin concentrations. Later age of diagnosis was associated with higher calprotectin.



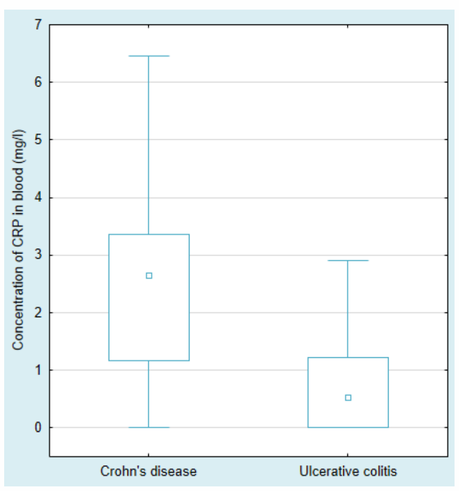


Figure 5. Comparison of CD and UC in values of acute phase protein **CRP** in their blood

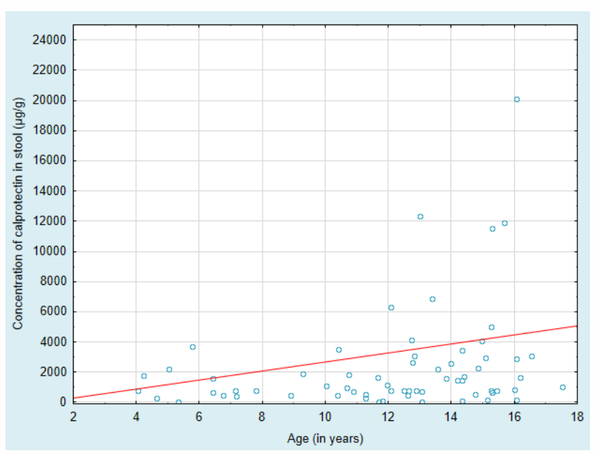


Figure 6. Calprotectin concentration in stool according to age of diagnosis

CASE REPORT

A girl with **Crohn's disease** experienced secondary osteoporosis along with other complications from IBD. Densitometric parameters were significantly reduced, and there were **multiple compressive fractures** requiring sodium pamidronate treatment.
The case was presented at two conferences and submitted for publication.

Overall, these findings highlight the importance of early diagnosis and appropriate monitoring of pediatric patients with IBD, particularly in regards to bone health and vitamin D levels. Additionally, biomarkers such as CRP and calprotectin may be useful in the diagnosis and management of IBD in children.

My research project involves supplementing the patient database with additional parameters, including **bone densitometry, wrist X-ray, and anthropometric measurements**. Blood samples are collected and stored for later determination of **osteoprotegerin and RANKL,** which play a significant role in bone remodeling. These tests can only be performed after sufficient samples have been collected from both the study and control groups due to the short shelf life of reagents.

Conclusions

Inflammatory bowel diseases (IBD) are increasingly affecting children, and bone health is a significant concern. Identifying and limiting risk factors is crucial for protecting children from bone degradation. The study aims to provide insight into the relationship between IBD and bone metabolism to develop more effective preventative and therapeutic strategies. Improving our understanding of this issue can lead to better quality of life and long-term health outcomes for children with IBD.