# Metabolic Bone Disorders in Children with Inflammatory Bowel Diseases

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## Introduction

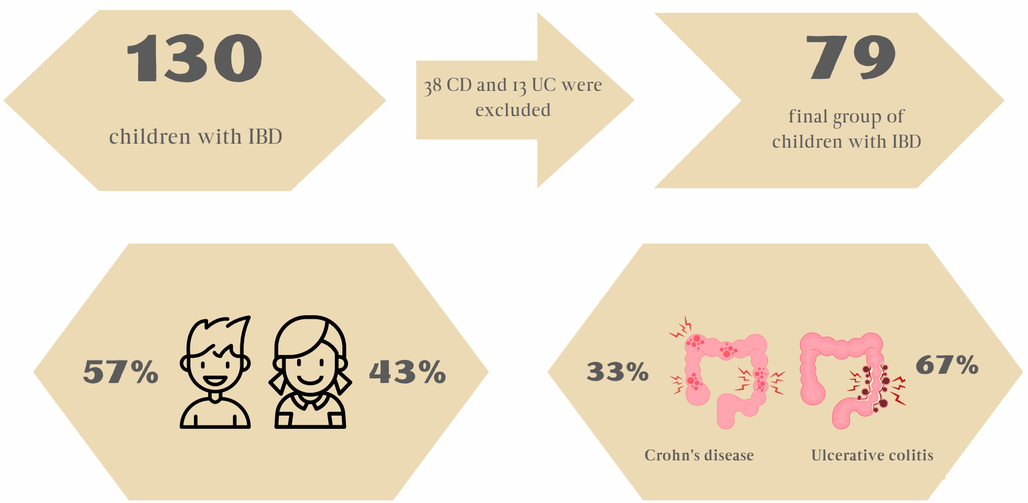
IBD is common in children, with an increasing incidence of Crohn's disease in the pediatric population, including infants, with an unknown cause. Although similar to adults, children with IBD are at a higher risk of developing growth retardation and extra-intestinal manifestations. They also frequently 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 Memorial Hospital 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.

**Table 1.**
*Clinical Presentation of IBD [1] in Children – Most Frequently Presented Symptoms*

| | Classification of IBD, % of Patients | | |
|---|---|---|---|
| **Presented Symptom** | **Crohn Disease** | **Ulcerative Colitis** | **Significance** |
| 1. Abdominal pain | 85% (n = 23) | 79% (n = 42) | p = 0.95 |
| 2. Diarrhea | 59% (n = 16) | 83% (n = 44) | p = 0.02 |
| 3. Rectal bleeding | 15% (n = 4) | 91% (n = 48) | p < 0.001 |
| 4. Weight loss | 33% (n = 9) | 32% (n = 17) | p = 0.83 |
| 5. Constipation | 19% (n = 5) | 13% (n = 7) | p = 0.49 |
| 6. Fever | 30% (n = 8) | 6% (n = 3) | p = 0.003 |

1 *IBD – inflammatory bowel disease*




*Characteristics of study group*

## 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. Blood samples are collected and stored for later determination of osteoprotegerin and RANKL, which play a significant role in bone remodeling. The completion of patient database supplementation is nearing its end.

During the current academic year, based on a previously conducted retrospective analysis of documentation from 130 patients with ulcerative colitis and Crohn's disease, an original publication has been prepared.

## 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.

Many children had low concentration of vitamin D and in the group of patients who underwent densitometry, nearly half (48%) had osteopenia. A low calcium level recorded at the time of diagnosis should increase physicians' vigilance regarding this aspect during the entire process of treating the child. Considering that delayed bone densitometry testing in IBD patients is often associated with lower bone density values, the issue of bone metabolism in children with non-specific inflammatory bowel diseases undoubtedly requires further research.

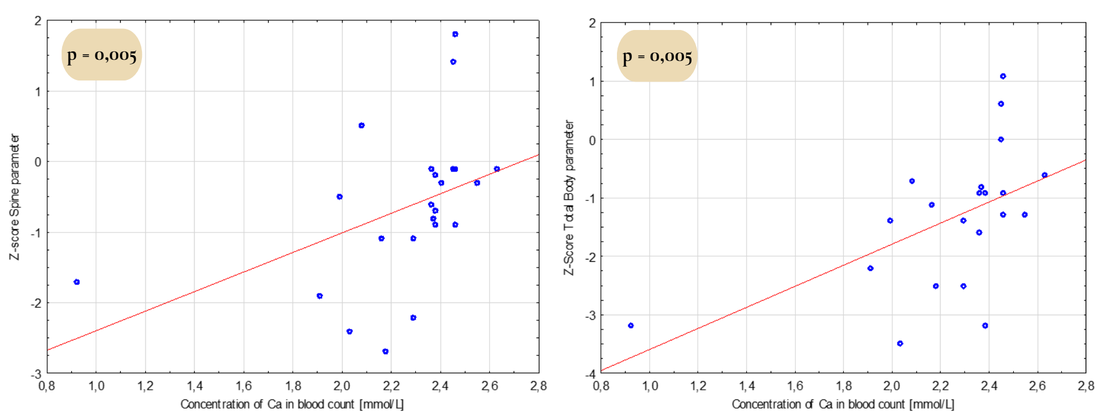



Figure 1. *Correlations between concentration of Ca in blood count and Z-Score Total Body and Spine parameters.*

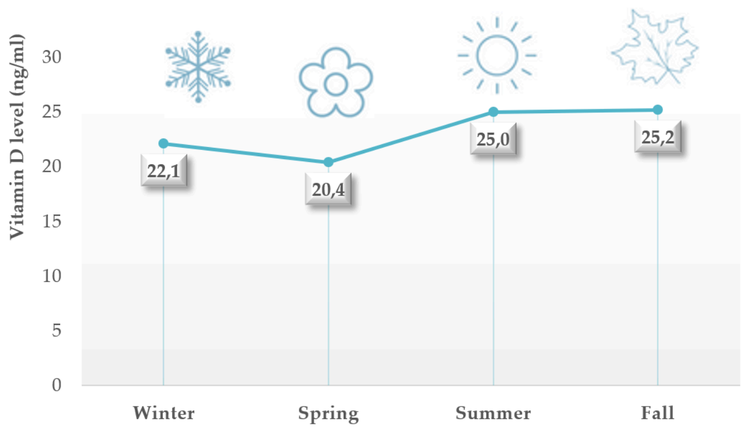



*Figure 2. Mean vitamin D levels according to the season of measurement.*

**78%**
insufficient vitamin D concentration

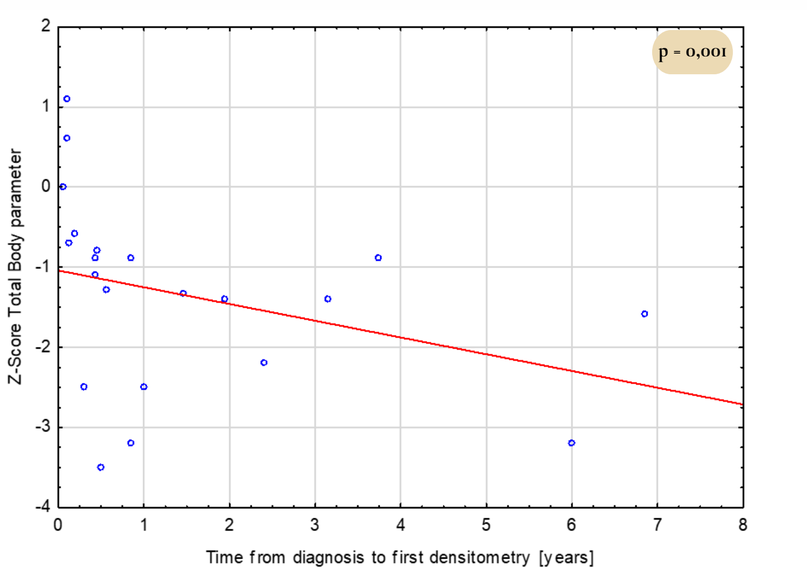



Figure 3. *Correlation between time from diagnosis to first densitometry and Z-Score Total Body parameter.*

**48%**
osteopenia / osteoporosis

### SCIENTIFIC ACHIEVEMENTS

- **Zakopiańskie Dnie Jelitowe -** passive participation
- **XV Przedświąteczne wydanie pediatrii opartej na przypadkach -** active participation
- **ESPGHAN GI Summer School in Toulouse (France) -** active participation
- **BMC Pediatrics -** "Early Symptoms and Diagnostic Parameters in Pediatric Inflammatory Bowel Disease: Implications for Subsequent Bone Disorders"

**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.

## 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.