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Ten-year trends in the clinical presentation of newly diagnosed patients with inflammatory bowel disease at the Department of Paediatric Gastroenterology and Hepatology in Zabrze, Poland

Zmiany w obrazie klinicznym u pacjentów z nowo rozpoznanymi nieswoistymi zapaleniami jelit na przestrzeni dziesięciu lat, leczonych na Oddziale Gastroenterologii i Hepatologii Dzieci w Zabrzu

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Abstract

Introduction and objective: Crohn's disease (CD) and ulcerative colitis (UC), which often impact individuals in their youth, significantly affect quality of life. This study analyses anthropometric data and clinical presentations of CD and UC over a 13-year period in newly diagnosed patients at the Department of Paediatric Gastroenterology and Hepatology in Zabrze, Poland. **Materials and methods:** Seventy-four CD patients and 90 UC patients were analysed, and categorised into four groups based on disease type and diagnosis period: Group A (CD, 2008–2011), Group B (CD, 2018–2021), Group C (UC, 2008–2011), and Group D (UC, 2018–2021). Collected data encompassed gender, age, weight, height, body mass index (BMI), duration of symptoms before diagnosis, disease location, and activity. **Results:** Among patients diagnosed between 2018 and 2021 (Groups B and D), CD exhibited a higher prevalence in boys (67.57% vs. 32.43%), while UC was more prevalent in girls (61.40% vs. 38.60%). Groups A and B demonstrated lower mean weight standard deviation scores (SDS) and BMI-SDS compared to Groups C and D. Symptom duration before diagnosis was shorter in Group C than in Group A (5 vs. 10 months) and in Group D compared to Group B (6 vs. 11 months). Severe CD activity at diagnosis was higher in Group A than in Group B (35.14% vs. 5.41%). The results were statistically significant – $p < 0.05$. **Conclusions:** UC diagnoses remain faster than CD, possibly due to more alarming symptoms. Patients diagnosed with CD demonstrate lower body weight and BMI compared to UC patients. The incidence of severe CD activity has significantly decreased over 13 years, potentially due to enhanced paediatric care and expedited diagnosis.

Keywords: Crohn's disease, ulcerative colitis, unspecified inflammatory bowel disease, child

Streszczenie

Wprowadzenie i cel: Choroba Leśniowskiego–Crohna (ChLC) oraz wrzodziejące zapalenie jelita grubego (WZJG) zazwyczaj występują w młodym wieku, wpływając na jakość życia. Celem pracy była analiza i porównanie danych antropometrycznych oraz objawów klinicznych obu chorób wśród nowo zdiagnozowanych pacjentów w okresie 13 lat na Oddziale Gastroenterologii i Hepatologii Dzieci w Zabrzu. **Materiał i metody:** Badaniem objęto 74 pacjentów z ChLC oraz 90 chorych z WZJG podzielonych na cztery grupy ze względu na rodzaj choroby i datę rozpoznania: Grupa A (ChLC, 2008–2011), Grupa B (ChLC, 2018–2021), Grupa C (WZJG, 2008–2011), Grupa D (WZJG, 2018–2021). Zebrano dane dotyczące: płci, wieku, wzrostu, wskaźnika masy ciała, czasu od pierwszych objawów do rozpoznania oraz lokalizacji i aktywności choroby. **Wyniki:** Wśród pacjentów zdiagnozowanych w latach 2018–2021 (grupy B i D) ChLC występowała częściej u chłopców (67,57% *vs* 32,43%), podczas gdy WZJG było bardziej powszechne u dziewcząt (61,40% *vs* 38,60%). Grupy A i B charakteryzował mniejszy średni wskaźnik odchylenia standardowego masy ciała i wskaźnika masy ciała w porównaniu z grupami C i D. Czas od wystąpienia pierwszych objawów do rozpoznania był krótszy w grupie C niż w grupie A (5 *vs* 10 miesięcy) oraz w grupie D względem grupy B (6 *vs* 11 miesięcy). Nasilona aktywność ChLC w momencie rozpoznania była częstsza w grupie A niż

w grupie B (35,14% *vs* 5,41%). Wyniki były istotne statystycznie – $p < 0,05$. **Wnioski:** WZJG pozostaje wciąż szybciej rozpoznawane niż ChLC, prawdopodobnie ze względu na bardziej alarmujące objawy. Pacjenci z ChLC cechowali się niższą masą ciała i mniejszym wskaźnikiem masy ciała w porównaniu z pacjentami z WZJG. Rozpoznawalność ciężkiej postaci ChLC znacząco się zmniejszyła w okresie 13 lat, przypuszczalnie dzięki lepszej opiece pediatrycznej i szybszej diagnozie.

Słowa kluczowe: choroba Leśniowskiego–Crohna, wrzodziejące zapalenie jelita grubego, nieswoiste zapalenia jelit, dziecko

INTRODUCTION

Over the years, there has been a worrying upward global trend in the incidence of inflammatory bowel disease (IBD) in children. The highest incidence is recorded in Northern European countries, followed by North America[1,2]. According to data from one of the most recent systematic reviews of 2018, which analysed data from 140 scientific reports across 38 countries over a 33-year period (1985–2018), children living in North America were most commonly affected by Crohn's disease (CD), with an incidence rate of 13.9/100,000 person-years, while the incidence rate for ulcerative colitis (UC) was the highest in Europe, at 15.0/100,000 person-years. The highest annual incidence of unclassified inflammatory bowel disease (IBD-U) was 3.6/100,000 in Europe and 2.1/100,000 in North America[1]. The incidence appears to be increasing in both newly industrialised and developing countries, as well as among first-generation immigrants, highlighting the complexity of the aetiology, in which both genetic and environmental factors are involved[3]. This makes inflammatory bowel disease a global medical concern, necessitating the development of new therapeutic and treatment options, and underscoring the need to involve not only the paediatric gastroenterology community, but also primary care physicians in the treatment process.

AIM OF THE STUDY

The aim of this study was to compare the anthropometric parameters and the clinical characteristics of patients diagnosed with *de novo* CD and UC, treated at the Department of Paediatric Gastroenterology and Hepatology in Zabrze between 2008 and 2011, and again a decade later, between 2018 and 2021.

MATERIALS AND METHODS

Study group characteristics and division

The study group comprised 74 and 90 patients, diagnosed with CD and UC, respectively, aged between 2 to 18 years (mean age: 12.80). The patients were organised into four groups according to the date of diagnosis and type of disease. Group A included 37 patients, diagnosed with CD between 2008 and 2011. Group B included 37 patients, diagnosed with CD between 2018 and 2021. Group C included 33 patients, diagnosed with UC between 2008 and 2011. Group D included 57 patients, diagnosed with UC between 2018 and 2021 (Tab. 1).

Type of disease	Date of diagnosis	
	2008–2011	2018–2021
CD	A ($n = 37$)	B ($n = 37$)
UC	C ($n = 33$)	D ($n = 57$)

CD – Crohn's disease; ***n*** – number; **UC** – ulcerative colitis.

Tab. 1. Characteristics and size of the patient groups studied

The collected data included several factors, such as gender, age, weight, height, and body mass index (BMI) of the patients. Additionally, the duration of symptoms before diagnosis, the location of the disease, and its activity level were considered. The Pediatric Crohn's Disease Activity Index (PCDAI) and the Pediatric Ulcerative Colitis Activity Index (PUCAI) were employed to determine the activity of CD and of UC in children, respectively.

Anthropometric data

The body weight of the patients was measured using a medical scale, while their height was measured with a stadiometer. The values obtained were used to calculate the BMI. They were also expressed as standard deviation scores (SDS) for age and sex according to the centile grids of the OLA and OLAF Programme of the Children's Memorial Health Institute (Warsaw, Poland)[4].

Statistical analysis

All the calculations were performed using Microsoft Excel and Statistica 12 software (StatSoft, Inc., Tulsa, OK, USA). Descriptive statistics for quantitative values were presented as mean values and standard deviations. The normality of data distribution was checked with the Shapiro–Wilk test. For comparative analysis (comparisons between study groups), the Student's *t*-test for independent samples or the Mann–Whitney *U* test (for data that had or did not have a normal distribution, respectively) were employed. Qualitative features were presented by the number of subjects and/or the percentage values in defined subgroups. The comparisons of frequency of qualitative features were performed using the Chi-square test. All *p*-values <0.05 were considered statistically significant.

RESULTS

Gender

A statistically significant higher prevalence of CD was found in boys among patients diagnosed between 2018 and

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Variable	2008–2011		2018–2021	
	CD Group A	UC Group C	CD Group B	UC Group D
Girls [%]	51.35	42.42	**32.43**	**61.40**
Boys [%]	48.65	57.58	**67.57**	**38.60**
Statistical significance	NS	NS	***p* < 0.05**	***p* < 0.05**

CD – Crohn's disease; **NS** – not significant; **UC** – ulcerative colitis.

Tab. 2. Characteristics of gender taking into account statistical differences

2021 (Group B; 67.57% vs. 32.43%; $p < 0.05$). No such gender difference was noted in the patients diagnosed with the same disease entity a decade earlier. Among the patients with ulcerative colitis, girls were significantly more likely to be diagnosed between 2018 and 2021 (group D 61.4% vs. 38.6%; $p < 0.05$). In the group diagnosed 10 years prior, no significant gender difference was observed among the affected patients (Tab. 2).

Anthropometric values

Both currently and a decade earlier, all the patients with CD presented statistically significantly lower body weight and BMI, expressed as SDS at diagnosis, compared to the group of patients with UC (A vs. C and B vs. D) (Tab. 3).

Duration of symptoms before diagnosis

Both currently and a decade earlier, ulcerative colitis was detected significantly earlier than CD (5 vs. 10 months, respectively, between 2008 and 2011; 6 vs. 11 months, respectively, between 2018 and 2021; $p < 0.05$) (Tab. 3).

Stage of disease at diagnosis

Between 2018 and 2021, there was a significant decrease in the proportion of patients with CD who presented with a severe disease flare at diagnosis, expressed by a high PCDAI score (>51 points) (B vs. A; 5.41% vs. 35.14%; $p < 0.05$) (Tab. 4).

Extent of inflammatory changes at diagnosis

No statistically significant differences were identified in the extent of inflammatory changes in groups B vs. A and D vs. C at diagnosis. However, currently, in both diseases, location 3 (ileocolonic for CD, extensive for UC) is the most common, but extensive lesions in UC occurred statistically more frequently in 2018–2021 than ileocolonic in CD (D vs. B, 77.19% vs. 48,65%; $p < 0.05$) (Tab. 4).

DISCUSSION

Among patients with inflammatory bowel disease, approximately 20–30% of cases are diagnosed in childhood[5]. The number of new cases among both girls and boys shows a global upward trend. In younger patients, the disease is often characterised by a more aggressive course and more extensive inflammatory changes than in adults. Very early onset of the disease is strongly associated with genetic abnormalities, resulting in a loss of intestinal barrier integrity and immune system dysfunction, including IL-10 issues[6]. In the study, a statistically significant male predominance was found out among CD patients diagnosed between 2018 and 2021. A similar observation can be found, for example, in the report by Moon (2019)[6], in which the incidence ratio of boys to girls was 1.8:1. Other international authors have also observed

Variable	2008–2011		Statistical significance	2018–2021		Statistical significance
	CD Group A	UC Group C		CD Group B	UC Group D	
Age [years]	13.4324	12.1515	NS	12.9459	12.6667	NS
Height SDS	−0.3390	−0.0859	NS	−0.3636	−0.2024	NS
Weight SDS	**−0.7796**	**0.0445**	***p* < 0.05**	**−0.5750**	**−0.1575**	***p* < 0.05**
BMI-SDS	**−0.7433**	**−0.0648**	***p* < 0.05**	**−0.5369**	**−0.075**	***p* < 0.05**
Duration before first symptoms [months]	**10.2500**	**4.9394**	***p* < 0.05**	**11.3784**	**6.4035**	***p* < 0.05**

BMI – body mass index; **CD** – Crohn's disease; **SDS** – standard deviation score; **UC** – ulcerative colitis.

Tab. 3. Characteristics of age and anthropometric data with statistical differences

Variable		CD		Statistical significance	UC		Statistical significance
		2008–2011 Group A	2018–2021 Group B		2008–2011 Group C	2018–2021 Group D	
Location	1	32.43%	35.14%		27.27%	8.77%	NS
	2	8.11%	16.22%		12.12%	14.04%	NS
	3	59.46%	**48.65%**		60.61%	**77.19%**	***p* < 0.05**
Activity	1	32.43%	37.84%		42.42%	45.61%	NS
	2	32.43%	56.76%		27.27%	40.35%	NS
	3	**35.14%**	**5.41%**	***p* < 0.05**	30.30%	14.04%	NS

Activity: **1** – mild; **2** – moderate; **3** – severe; **CD** – Crohn's disease; Location CD: **1** – distal 1/3 ileum, **2** – colonic, **3** – ileocolonic; Location UC: **1** – ulcerative proctitis, **2** – left-sided UC, **3** – extensive; **UC** – ulcerative.

Tab. 4. Characteristics of disease stage and the extent of inflammatory changes at diagnosis with statistical differences

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a predominance of boys among paediatric patients with CD[7,8]. In studies on the Polish population, there are also papers indicating male dominance[9,10]. However, this trend changes when adulthood is achieved, with higher incidence rates recorded among women[11,12]. Beyond gender differences, most research indicates that the disease is a combination of genetic and environmental factors. It has been determined that the risk of the disease for boys and girls who are *NOD2* gene homozygotes is 20–40 times higher than in the general population. Among environmental factors, the following are highlighted: cigarette smoking, use of oral contraceptives, antibiotic therapy, repeated use of non-steroidal anti-inflammatory drugs, and living in a highly industrialised environment. Moreover, a diet based on highly processed products, with high amounts of raising agents, artificial colours, and foods containing mucopolysaccharides and sulphur-containing amino acids provides substrates for sulphite-reducing bacteria. The resulting sulphur compounds damage the intestinal epithelium. In contrast, dietary omega-3 fatty acids have a beneficial effect on reducing the incidence of inflammatory bowel disease[13].

Factors that reduce the risk of the disease include having pets, contact with livestock, eating fruit and fibre-rich products, regular physical activity, and sharing a room with siblings. Importantly, no association of vaccination with an increased risk of CD has been demonstrated to date[14–17].

In the follow-up, we showed a statistically significant prevalence of girls among the patients with UC diagnosed between 2018 and 2021. However, most studies do not indicate a female predominance in children[18]. The result of the study may be influenced by the relatively small size of the study groups.

In adults, on the other hand[19], in a large follow-up of 10,218 UC patients between 1981 and 2000, almost identical incidence rates were found among men and women, with a ratio of 1:0.9.

In the study, we also showed that the children with CD had a lower body weight at diagnosis compared to the patients with UC. Body weight loss is a common symptom of inflammatory bowel disease, which is caused by complex mechanisms such as intestinal malabsorption, disruption in gut microbiota including small intestine bacterial overgrowth, loss of appetite, nausea, and vomiting. Due to the possible wider extent of inflammatory changes in CD, these patients are at particular risk of malnutrition. In the adult population, it affects 65–75% of patients. In UC, the percentage is 18–62%[20]. Additionally, patients with CD are predisposed to malabsorption of folic acid, vitamins A and D. In turn, individuals after extensive intestinal resection are additionally at risk of vitamin B_{12} malabsorption and zinc, iron, and magnesium deficiencies[21–23]. Krzesiek et al. showed that bone mineralisation disorders are a common complication of inflammatory bowel disease, occurring more frequently in patients with CD. Decreased bone mineral density has been shown to correlate with both disease activity and the nutritional status of patients[24]. What is more, poor nutritional status in IBD patients has a greater impact on bone mineral density than systemic corticosteroid therapy[25]. In addition, among children with inflammatory bowel disease, energy requirements increase significantly during periods of sustained disease activity, which is one reason for stunted growth in children with prolonged lack of clinical remission[21]. This highlights the importance of nutritional therapy in the treatment of moderate to mild CD, as it can improve the nutritional status of patients and reduce the need for systemic glucocorticotherapy, which further impairs growth in children. It has been shown to be effective in up to 80–85% of paediatric patients[26]. The fact that CD is often diagnosed only after months of uncharacteristic symptoms also has a negative impact on the nutritional status, delaying the achievement of remission, which is a prerequisite for an improvement in nutritional status.

In the study, we showed that both a decade ago and currently, UC is diagnosed earlier than CD. This is probably due to the disease's characteristic leading symptom, lower gastrointestinal bleeding, which causes great concern for parents. The longer time from the first symptoms to diagnosis in CD is due to its less characteristic symptomatology. The classic triad of symptoms – abdominal pain, diarrhoea, and weight loss – is exhibited by only 25% of children[27]. Nevertheless, the average time from the first symptoms to diagnosis appears unsatisfactory in both diseases. For comparison, in Croatia, a European country with a similar population to Poland, the average time from the first symptoms to diagnosis for UC in children is 2.0 (1.0–5.0) months, and for CD, it is 3.0 (2.0–6.0) months[28]. Given that Croatia has 0.9 more hospital beds per 1,000 inhabitants, the problem likely lies in the availability of hospital diagnostics, which is essential for proper diagnosis in children. Between 2018 and 2021, there was a significant decrease in the proportion of patients with CD who presented with a severe disease flare at diagnosis, indicated by a high PCDAI score (>51 points) (B vs. A; 5.41% vs. 35.14%; $p < 0.05$). The extent of inflammatory changes, as determined by the PARIS scale, had not changed, either in CD or UC patients, over 10 years. In the group of children with CD, the predominant disease involvement was described as L3 (ileocolic form). In children with ulcerative colitis, the extensive form predominated (E3–E4). This finding is consistent with the global trend, where children with CD demonstrate a 43% predominance of the parenteral type (L3 + L4) at diagnosis[29]. With regard to UC, it has been shown that 82% of children present with significant lesions at the time of diagnosis, compared to only 48% in adults. In addition, in many cases (46%), progression of inflammatory lesions towards more extensive involvement is observed in long-term follow-up. An early onset of the disease is also a factor that increases the risk of colectomy in adulthood[27,29].

The study was limited by the small size of the groups; however, the homogeneity of the patient groups studied was an unquestionable strength of the study.

CONCLUSIONS

1. UC is diagnosed significantly earlier than CD; however, both a decade ago and currently, it takes about 6 months to obtain a diagnosis. There is a need for continuous

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education of both doctors and patients to raise awareness of the alarming symptoms of the disease, as well as to improve the health care system and reduce waiting times for outpatient clinics and specialist departments.
2. CD is more frequently accompanied by weight loss and stunted growth than UC. Paediatricians should monitor the growth pattern of their patients and include inflammatory bowel disease in the differential diagnosis of growth retardation.
3. Over the years, the proportion of patients with CD presenting with a severe flare-up at the time of diagnosis has decreased at our centre, possibly due to greater awareness of inflammatory bowel disease among parents and doctors, better diagnostic capabilities, and improved availability of state-of-the art diagnostic equipment. However, efforts should still be undertaken to accelerate the diagnostic pathway in patients suspected of having IBD.

Conflict of interest

The authors do not report any financial or personal connections with other persons or organisations which might negatively affect the content of this publication and/or claim authorship rights to this publication.

Author contributions

Original concept of study: KBD. Collection, recording and/or compilation of data: KT, KS, PS, PA. Analysis and interpretation of data: AZF, KT, KS, PA, PA, KBD. Writing of manuscript: AZJ, KT, KS, PS. Critical review of manuscript; final approval of manuscript: AZJ, PA, KBD.

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