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Clinical characteristics and nursing diagnoses of pediatric patients hospitalized with inflammatory bowel disease: a single-center retrospective study in South Korea

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Purpose: This study aimed to identify clinical characteristics of South Korean pediatric inflammatory bowel disease (IBD) in a children's hospital over the past 5 years, with a specific focus on comparing the features observed between Crohn's disease (CD) and ulcerative colitis (UC). Additionally, it aimed to examine the nursing diagnoses given to patients. **Methods:** This retrospective study analyzed the medical records of Korean pediatric patients under 18 years of age who were diagnosed with IBD and hospitalized at a children's hospital in Seoul, South Korea, from January 2017 to December 2021. **Results:** The number of pediatric patients diagnosed with IBD steadily increased. This finding was particularly prominent for CD patients, the majority of whom were male. Pediatric patients with CD had significantly higher rates of abdominal pain and perianal lesions, while pediatric patients with UC had a higher rate of bloody stool. Laboratory findings indicated that CD patients had higher levels of inflammatory markers and lower albumin levels than UC patients. The nursing diagnoses given during hospitalization mostly related to safety and protection, physical comfort, and gastrointestinal function. **Conclusion:** This study provides insights into Korean pediatric IBD patients, enabling early detection and the development of nursing intervention strategies. From a comprehensive perspective, nursing care should not only address patients' physical needs but also their psychosocial needs.

Key words: Inflammatory bowel diseases; Colitis, ulcerative; Crohn disease; Child; Adolescent

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INTRODUCTION

Inflammatory bowel disease (IBD) is a chronic intestinal disease characterized by repeated inflammation and relapses and encompasses ulcerative colitis (UC) and Crohn's disease (CD) [1]. IBD is a chronic inflammatory disease of the digestive tract that is commonly diagnosed during adolescence and early adulthood, with about 25% of all IBD patients diagnosed before the age of 18 years [2]. In the past, IBD was considered a rare disease that occurred mainly in North America, Europe, and other Western countries, while it was less prevalent in South America, Eastern Europe, Asia, and Africa. However, in recent years, the incidence and prevalence of pediatric IBD have been increasing worldwide [3].

In the United States, the prevalence of pediatric IBD increased more than two-fold from 33 to 77 cases per 100,000 population between 2007 and 2016 [4]. Similarly, in Southern England, the incidence of pediatric IBD has continued to rise over a 20-year period (2002-2021), with an average annual increase in prevalence of 1.71% from 2017 to 2021 [5]. In South Korea, due to a lack of nationwide surveys, it is not possible to accurately determine the incidence and prevalence of pediatric IBD. However, previous studies have suggested a significant increase in the number of pediatric IBD patients since the 2000s [6]. Moreover, population-based studies in the Daegu-Gyeongbuk region have observed an increasing trend in the incidence of pediatric IBD, with rates rising from 0.86 cases per 100,000 population in 2011 to 13.33 cases per 100,000 population in 2020 [7,8].

When children are diagnosed with IBD, it imposes sub-

stantial physical and psychosocial burdens, including growth failure, delayed puberty, challenges in peer relationships, difficulties in school life, and psychological distress [9]. Fortunately, advancements in medical treatments have expanded the range of available medications, enabling individuals with IBD to exert greater control over their condition. Therefore, early diagnosis and effective management are crucial for preventing complications and enhancing the quality of life of these young patients.

However, diagnosing pediatric IBD is a challenge. Since the exact cause of pediatric IBD is not yet known, there is no standardized diagnostic method, and the diagnosis is based on a combination of clinical symptoms and examination findings. Moreover, the epidemiology and clinical features of IBD vary by region, ethnicity, and age of onset [10,11], further complicating the diagnostic process. Additionally, distinguishing between different forms of IBD is crucial as treatment options may differ in effectiveness [12], yet this can be challenging due to overlapping symptoms [13]. Therefore, considering the rising incidence and prevalence of pediatric IBD in Korea, it is crucial to identify the clinical characteristics of Korean pediatric patients with IBD and compare the features between the subtypes of IBD, specifically CD and UC.

In Korea, several studies have been conducted to understand the clinical characteristics of pediatric patients with IBD [6-8,14-16]. However, previous studies in Korea have mainly focused on pediatric patients diagnosed until the mid-2010s [6,7,14-16], and the study that reflected the most current trends was limited to a specific region [8]. Therefore, there is a need for a study that includes a larger population of Korean pediatric patients and reflects the recent trends in pediatric IBD in South Korea. So, the objective of this study was to investigate the clinical characteristics of Korean pediatric patients diagnosed with IBD at a tertiary pediatric hospital over the last 5 years and to compare the specific characteristics between CD and UC. By examining and comparing these clinical characteristics, this study provides valuable insights that can play a crucial role in facilitating early detection, accurate diagnosis, and effective management of pediatric IBD.

Additionally, this study also aimed to examine nursing diagnoses given to pediatric IBD patients. The nursing diagnosis, as standardized by the North American Nursing Diagnosis Association (NANDA), is an important component of the nursing process. It helps nurses identify specific patient problems, risks, and strengths, enabling them to prioritize care and determine nursing interventions based on the individual's unique needs. By comprehensively understanding the nursing diagnoses given to pediatric IBD patients, valuable insights can be gained into the common issues faced by these patients and current nursing management practices implemented in clinical settings. These insights can serve as foundational data for developing targeted interventions that effectively address the specific needs of pediatric patients with IBD. Ultimately, the findings from this study have the potential to enhance the quality of care provided to pediatric IBD patients and improve their overall quality of life.

METHODS

Ethics statement: The Institutional Review Board (IRB) of the Seoul National University Hospital (No. 2209-083-1359) reviewed this study. The committee decided that this study was an exempt research study.

1. Study Design

This retrospective study analyzed medical records of pediatric patients diagnosed with IBD who were hospitalized at a tertiary hospital located in Seoul, South Korea. It aimed to identify the clinical characteristics of Korean pediatric patients with IBD in a children's hospital over the past 5 years, with a specific focus on comparing the symptoms of CD and UC. Additionally, the nursing diagnoses given to patients were examined. This study followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guidelines [17].

2. Setting and Samples

The subjects of this study were Korean pediatric patients under 18 years of age who were diagnosed with IBD and hospitalized at a children's hospital in Seoul, South Korea, from January 2017 to December 2021. IBD patients were defined as those with a confirmed diagnosis code indicating CD (K50) or UC (K51) based on the Korean Standard Classification of Diseases codes. In accordance with the study's purpose of investigating the clinical characteristics of pediatric patients in South Korea at the time of diagnosis, foreign patients were excluded from the study. Additionally, cases were excluded if there was a confirmed underlying condition but the medical records expressed uncertainty or ambiguity regarding the diagnosis of IBD. Patients who were admitted for reasons other than diagnostic purposes, such as seeking a second opinion or participating in a clinical trial, were also excluded from the study. Using the hospital's data warehouse system, a total of 169 pediatric patients under the age of 18 who first received a confirmed diagnosis of CD or UC from January 2017 to December 2021 were identified. Among them, three foreign patients were excluded. Additionally, 19 patients with ambiguous diagnostic descriptions and 20 patients admitted for rea-

sons other than diagnostic purposes were excluded. As a result, a total of 126 patients were analyzed, including 110 with CD and 16 with UC (Supplement 1).

3. Measurements

1) Clinical characteristics at the time of diagnosis

(1) Baseline characteristics

Sex, age at diagnosis, height, weight, body mass index (BMI), diagnosis, and diagnosis year were investigated. Height, weight, and BMI were converted to age and sex-specific percentiles based on the 2017 Korean National Growth Charts (KNGC) for children and adolescents [18]. According to the criteria provided in the 2017 KNGC, short stature was defined as a height below the third percentile for age, and underweight was defined as a weight below the fifth percentile for age.

(2) Disease activity

The Pediatric Crohn's Disease Activity Index (PCDAI) and Pediatric Ulcerative Colitis Activity Index (PUCAI) were used to assess CD and UC, respectively. CD was considered inactive for PCDAI scores of less than 10 points, mild for scores ranging from 10 to 29 points, and moderate to severe for scores of 30 points or higher. UC was considered to be in remission for PUCAI scores of less than 10 points, mild for scores ranging from 10 to 34 points, moderate for scores ranging from 35 to 64 points, and severe for scores of 65 points or higher. Variables measured after the initiation of treatment were excluded.

(3) Clinical symptoms

Clinical symptoms experienced by patients until diagnosis were examined and included abdominal pain, diarrhea, bloody stool, weight loss, fever, oral ulcers, perianal lesions, arthralgia, erythema nodosum, and tenesmus. Perianal lesions were defined as skin tags, fissures, fistulas, stenoses/strictures, and abscesses.

(4) Laboratory findings

Laboratory findings were investigated for white blood cell (WBC) count, hemoglobin (Hb), platelet (PLT), albumin, erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), and fecal calprotectin (FC). Variables measured after discharge or initiation of treatment were excluded, and the variables collected were based on the closest day to the date of admission.

2) Nursing diagnoses given during the hospitalization period

The nursing diagnoses given during the hospitalization period of patients were investigated and classified using the nursing diagnoses provided by NANDA [19].

4. Data Collection and Procedure

This study was conducted after receiving approval for the research plan and waiver of informed consent from the IRB of the university hospital (no. 2209-083-1359). Data were collected by reviewing the electronic medical records of patients using the clinical data warehouse system of the hospital. Data collection was performed from December 1, 2022 to May 4, 2023.

5. Data Analysis

For statistical analysis, SPSS Statistics for Mac (version 29; IBM Corp.) was used. Descriptive statistics, including means and standard deviations for continuous variables and frequencies and percentages for categorical variables, were used to analyze the participants' clinical characteristics and nursing diagnoses. To examine the differences in clinical characteristics based on the participants' diagnosis, the t-test was used for continuous variables, while the chi-square test was used for categorical variables. The statistical significance threshold was set at $p<.05$.

RESULTS

1. Clinical Characteristics at the Time of Diagnosis

1) Annual number of children newly diagnosed with IBD

A total of 126 patients with IBD, specifically 110 patients with CD and 16 patients with UC, were identified. From 2017 to 2021, there were 25, 17, 17, 23, and 44 newly diagnosed cases of pediatric IBD (Figure 1). Among them, the incidence of CD was 22, 13, 15, 22, and 38 from 2017 to 2021, respectively, while the incidence of UC was 3, 4, 2, 1, and 6 in the same years. The incidence of pediatric IBD has been gradually increasing, particularly with a noticeable increase in CD patients.

2) Baseline characteristics

Of the 126 patients, 110 (87.3%) had CD and 16 (12.7%) had UC, indicating a high proportion of CD patients. The ratio of male to female CD patients was 3.4 to 1, while it was 1 to 1 for UC, indicating a significantly higher proportion of males among CD patients (p=.020). The mean age at diagnosis was 12.07±3.41 years for CD and 11.38±3.32 years for UC, with no significant difference between the groups (p=.444). At the time of diagnosis, there was a significant difference in weight percentiles between the groups (p=.039), with values of 33.12±31.15 for CD and 50.21±26.01 for UC. The height percentiles at diagnosis were 47.79±30.46 for CD and 54.69±29.48 for UC, while the BMI percentiles were 30.24±31.96 for CD and 44.84±

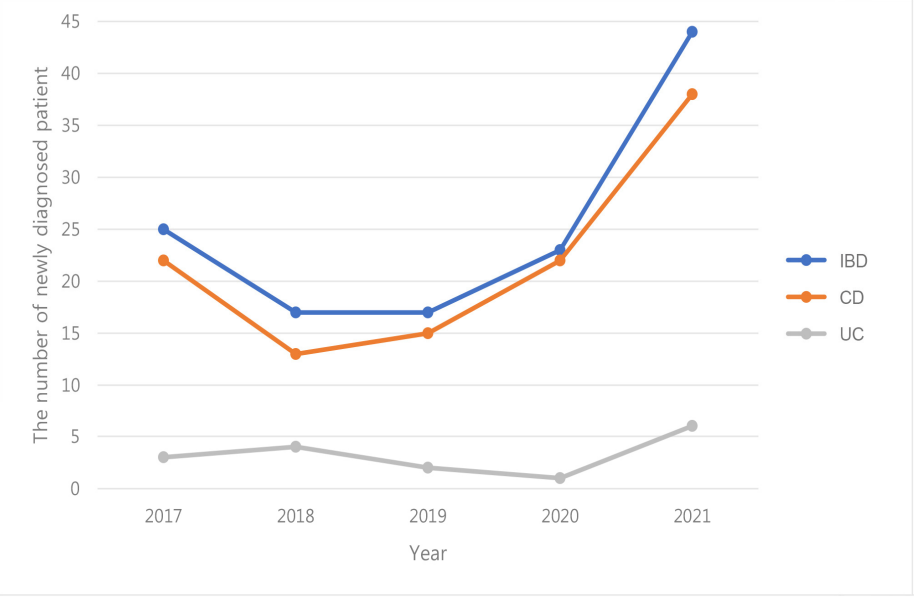

Figure 1. The number of newly diagnosed pediatric patients with inflammatory bowel disease. CD, Crohn's disease; IBD, inflammatory bowel disease; UC, ulcerative colitis.

28.05 for UC. There were no significant differences in the height or BMI percentiles between the groups at diagnosis. The prevalence of short stature was 4.6% in CD patients, and there was no significant difference between the groups. The rate of underweight was 24.5% for CD patients and 6.3% for UC patients, with no significant difference observed. The baseline characteristics of the patients are summarized in Table 1.

3) Disease activity

The mean PCDAI score was 32.70±15.03, with 4.8% of cases classified as inactive, 33.3% as mild, and 61.9% as moderate to severe. The mean PUCAI score was 38.00±18.78, with no cases classified as in remission, 40.0% as mild, 46.7% as moderate, and 13.3% as severe.

4) Clinical symptoms

Abdominal pain was the most common CD symptom at 70.9%, followed by diarrhea (68.2%), perianal lesion (64.5%), weight loss (45.5%), fever (30.9%), bloody stool (21.8%), oral ulcer (17.3%), erythema nodosum (4.5%), arthralgia (2.7%), and tenesmus (0.9%). Among UC patients, the most frequent symptom was bloody stool at 93.8%, followed by diarrhea (50.0%), abdominal pain (31.3%), weight loss (31.3%), fever (12.5%), perianal lesions (12.5%), and tenesmus (6.3%). CD patients were found to experience abdominal pain (CD, 70.9%; UC, 31.3%; p=.002) and perianal lesions (CD, 64.5%; UC, 12.5%; p<.001) at higher rates than UC patients. Conversely, UC patients were found to experience bloody stool more frequently than CD patients (CD, 21.8%; UC, 93.8%; p<.001). The clinical symptoms of patients are summarized in Table 2.

5) Laboratory findings

Patients with CD had a mean WBC count of 10.86±4.48 $\times10^3/\mu$L, a mean Hb level of 12.01±1.77 g/dL, a mean PLT count of 441.33±127.77$\times10^3/\mu$L, a mean albumin level of 3.71±0.51 g/dL, a mean ESR of 47.65±29.78 mm/hr, and a mean CRP level of 3.60±4.18 mg/dL. Among CD patients, 7.4% had FC levels below 100 μg/g, while 92.6% had FC levels of 100 μg/g or above. Patients with UC had a mean WBC count of 9.78±3.36$\times10^3/\mu$L, a mean Hb level of 11.27±2.36 g/dL, a mean PLT count of 391.94±99.77$\times10^3/\mu$L, a mean albumin level of 3.99±0.45 g/dL, a mean ESR of 23.43±27.28 mm/hr, and a mean CRP level of 0.17±0.21 mg/dL. Among UC patients, 12.5% had FC levels below 100 μg/g, while 87.5% had FC levels of 100 μg/g or above. Compared to UC patients, CD patients had a significantly higher mean ESR (CD, 47.65 ±29.78 mm/hr; UC, 23.43±27.28 mm/hr; p=.005) and CRP level (CD, 3.60±4.18 mg/dL; UC, 0.17±0.21 mg/dL; p<.001) and a significantly lower mean albumin level (CD, 3.71±0.51 g/dL; UC, 3.99±0.45 g/dL; p=.044). Laboratory findings are summarized in Table 3.

2. Nursing Diagnoses Given During the Hospitalization Period

Twenty-two nursing diagnoses were given based on the nursing records of the subjects, with a total of 3,070 occurrences. These were classified into six domains, ten classes, and

Table 1. Baseline Characteristics and Disease Activity of Newly Diagnosed Pediatric Inflammatory Bowel Disease Patients (*N*=126)

Variables	Crohn's disease (n=110)	Ulcerative colitis (n=16)	x^2 or t	*p*
	n (%) or M±SD	n (%) or M±SD		
Male	85 (77.3)	8 (50.0)	5.38	.020
Age at diagnosis (year)	12.07±3.41	11.38±3.32	0.77	.444
Height percentile	47.79±30.46	54.69±29.48	-0.85	.397
Short stature	5 (4.6)	0 (0.0)	0.77	.382
Weight percentile	33.12±31.15	50.21±26.01	-2.09	.039
Underweight	27 (24.5)	1 (6.3)	2.71	.100
BMI percentile	30.24±31.96	44.84±28.05	-1.73	.086
PCDAI score at diagnosis[a)]	32.70±15.03			
Inactive	4 (4.8)			
Mild	28 (33.3)			
Moderate/severe	52 (61.9)			
PUCAI score at diagnosis[a)]		38.00±18.78		
In remission		0 (0.0)		
Mild		6 (40.0)		
Moderate		7 (46.7)		
Severe		2 (13.3)		

[a)]Missing data is not included; BMI, body mass index; M, mean; PCDAI, Pediatric Crohn's Disease Activity Index; PUCAI, Pediatric Ulcerative Colitis Activity Index; SD, standard deviation.

Table 2. Clinical Manifestations (Symptoms or Signs) of Newly Diagnosed Pediatric Inflammatory Bowel Disease Patients (*N*=126)

Variables	Crohn's disease (n=110)	Ulcerative colitis (n=16)	x^2 or t	*p*
	n (%)	n (%)		
Abdominal pain	78 (70.9)	5 (31.3)	9.77	.002
Diarrhea	75 (68.2)	8 (50.0)	2.05	.152
Bloody stool	24 (21.8)	15 (93.8)	33.82	<.001
Weight loss	50 (45.5)	5 (31.3)	1.15	.284
Fever	34 (30.9)	2 (12.5)	2.32	.128
Oral ulcer	19 (17.3)	0 (0.0)	3.25	.071
Perianal lesion	71 (64.5)	2 (12.5)	15.53	<.001
Arthralgia	3 (2.7)	0 (0.0)	0.45	.504
Erythema nodosum	5 (4.5)	0 (0.0)	0.76	.384
Tenesmus	1 (0.9)	1 (6.3)	2.55	.110

18 nursing diagnoses according to the NANDA nursing diagnosis system. Of the 13 NANDA nursing diagnosis domains, six domains were identified. Safety and protection had the highest number of occurrences at 1,364 (44.4%), followed by comfort at 854 (27.8%), elimination and exchange at 748 (24.4%), nutrition at 96 (3.1%), activity and rest at 7 (0.2%), and coping and stress tolerance at 1 (0.03%). In terms of frequency by class, nursing diagnoses corresponding to gastrointestinal function had the highest number of occurrences at 748 (24.4%), followed by infection at 725 (23.6%), physical comfort at 623 (20.3%), and physical injury at 505 (16.4%). In terms of frequency by nursing diagnosis, the risk of infection was the highest at 725 (23.6%), followed by acute pain at 615 (20.0%), diarrhea at 467 (15.2%), the risk of bleeding at 362 (11.8%), and dysfunctional gastrointestinal motility at 275 (9.0%). A variety of nursing diagnoses were included (Table 4).

Table 3. Laboratory Findings of Newly Diagnosed Pediatric Inflammatory Bowel Disease Patients (*N*=126)

Variables	Crohn's disease (n=110)	Ulcerative colitis (n=16)	x^2 or t	*p*
	M±SD or n (%)	M±SD or n (%)		
WBC ($\times 10^3/\mu L$)	10.86±4.48	9.78±3.36	0.93	.353
Hb (g/dL)	12.01±1.77	11.27±2.36	1.21	.243
PLT ($\times 10^3/\mu L$)	441.34±127.77	391.94±99.77	1.48	.141
Albumin (g/dL)	3.71±0.51	3.99±0.45	-2.04	.044
ESR (mm/hr)	47.65±29.78	23.43±27.28	2.89	.005
CRP (mg/dL)	3.60±4.18	0.17±0.21	8.52	<.001
Fecal calprotectin ($\mu g/g$)[a]			0.54	.764
<100	8 (7.4)	2 (12.5)		
≥100	100 (92.6)	14 (87.5)		

[a]Missing data is not included; CRP, C-reactive protein; ESR, erythrocyte sedimentation rate; Hb, hemoglobin; M, mean; PLT, platelet; SD, standard deviation; WBC, white blood cell count.

Table 4. Frequency of Nursing Diagnoses Given to Pediatric Inflammatory Bowel Disease Patients during Hospitalization (*N*=3,070)

Domains	Class	Nursing diagnosis	n (%)
Nutrition	Ingestion	Imbalanced nutrition: less than the body's requirements	85 (2.8)
	Hydration	Deficient fluid volume	11 (0.4)
Elimination and exchange	Gastrointestinal function	Constipation	6 (0.2)
		Diarrhea	467 (15.2)
		Dysfunctional gastrointestinal motility	275 (9.0)
Activity/rest	Cardiovascular/pulmonary responses	Ineffective breathing pattern	7 (0.2)
Coping/stress tolerance	Coping responses	Anxiety	1 (0.0)
Safety/protection	Infection	Risk for infection	725 (23.6)
	Physical injury	Ineffective airway clearance	42 (1.4)
		Risk for bleeding	362 (11.8)
		Risk for child falls	5 (0.2)
		Impaired oral mucous membrane integrity	16 (0.5)
		Impaired skin integrity	51 (1.7)
		Risk for impaired skin integrity	29 (0.9)
	Thermoregulation	Hyperthermia	134 (4.4)
Comfort	Physical comfort	Nausea	8 (0.3)
		Acute pain	615 (20.0)
	Physical/environmental/social comfort	Impaired comfort	231 (7.5)

DISCUSSION

This study investigated the clinical characteristics and nursing diagnoses of pediatric patients aged 18 years or younger who were newly diagnosed with IBD at a tertiary hospital in Seoul, Korea, from 2017 to 2021.

The increasing global incidence of IBD among children and adolescents highlights the need for early detection and effective management. Notably, in this study, the incidence of pediatric IBD in Korea was found to be on the rise, and this finding was particularly prominent in cases of CD. This aligns with previous research indicating a growing number of pediatric CD and IBD patients in Korea since the start of the 21st century [7,15].

The significant predominance of CD over UC among pediatric IBD patients observed in this study and supported by pre-

vious domestic and international research highlights an important epidemiological trend. The ratios of CD to UC reported in different countries further reinforce this pattern, with ratios ranging from 1 to 1.1 to 4.1 to 1 in Korea [6,7,20] and 1.2 to 1 to 3.3 to 1 in other countries such as Sweden, China, the United States, and Saudi Arabia [21-24]. These findings suggest that there may be distinct factors contributing to the pathogenesis and development of CD and UC in pediatric populations. However, a study from Japan reported a ratio of CD to UC of 1 to 1.6, which diverges from the observed trend [25]. This discrepancy suggests potential genetic, environmental, or population-specific factors that influence the prevalence of CD and UC in different regions. Further research is needed to explore the underlying mechanisms and factors that contribute to these epidemiological patterns.

In addition, the study found a significant male predominance in pediatric CD, with a ratio of males to females of 3.4 to 1. This observation is consistent with previous domestic and international studies, which have consistently reported a higher proportion of males among CD patients. The ratio of male to female pediatric CD patients ranged from 2 to 1 to 6.5 to 1 in Korean studies [6,7,14,15] and from 1.5 to 1 to 2 to 1 in studies from other countries [21-23,25]. These findings collectively indicate a global trend of male predominance in pediatric CD cases.

Pediatric patients with IBD are at high risk of growth failure, which is known to be caused by multiple factors, including inadequate nutritional intake, increased nutritional demands, malabsorption, medications that inhibit growth factors, inflammatory mediators, and genetic factors [26]. Although no significant difference was found in the mean height percentile between CD and UC patients at diagnosis, CD patients tended to weigh less and were more likely to have short stature and be underweight than UC patients. Previous studies have consistently shown a higher incidence of growth problems in CD patients than in UC patients [26,27]. This study reaffirms these findings due to its similar results, indicating a higher prevalence of short stature and underweight in CD patients than in UC patients. Growth failure in pediatric IBD patients can lead to various physical, psychological, and social problems that directly affect patients' quality of life. Early identification of high-risk groups for growth failure and the implementation of multidisciplinary nutritional support are necessary for promoting normal growth in these patients.

The typical triad of CD symptoms is abdominal pain, diarrhea, and weight loss. Based on the results of this study, Korean pediatric CD patients tend to experience other symptoms in addition to the three main symptoms of CD, with a high rate of perianal lesions in particular. This is consistent with previous studies conducted in Korea that found that more than half of Korean pediatric CD patients had perianal lesions at the time of diagnosis [6,7,15]. In contrast, a study conducted in China reported that 11.1% of patients had perianal lesions [22], while a study in the UK reported a 7% rate [27] and a study in New Zealand reported a 39% rate [28]; therefore, a relatively high proportion of Korean pediatric CD patients had perianal lesions. Compared to UC patients, CD patients experienced perianal lesions at a higher rate, as well as abdominal pain. Based on these results, the initial clinical symptoms in Korean pediatric CD patients may not always be abdominal pain, diarrhea, and weight loss, and the presence of perianal lesions may be a major piece of evidence suggesting CD.

Typical symptoms of UC are bloody stool, diarrhea, and abdominal pain, and, among them, the hallmark is bloody stool [29]. In this study, 93.8% of UC patients experienced bloody stool, followed by diarrhea (50.0%), abdominal pain (31.3%), weight loss (31.3%), fever (12.5%), perianal lesion (12.5%), and tenesmus (6.3%). When comparing symptoms between CD and UC, bloody stool was found to be more common in UC patients (p<.001). This suggests that bloody stool is still a hallmark of UC and can play an important role when differentiating between CD and UC.

The results of this study showed a significantly higher ESR and CRP level in CD patients than in UC patients, which aligns with the findings of a previous study conducted in the US [30]. Furthermore, the study also found that CD patients had significantly lower albumin levels than UC patients, which is consistent with previous domestic studies [16]. It is worth noting that previous research has suggested that pediatric CD patients whose upper gastrointestinal tracts are affected tend to have lower albumin levels than those whose condition is limited to the colon [31]. Therefore, while the results of this study indicate a general trend, they should be considered alongside other diagnostic tests.

Calprotectin is a protein secreted by neutrophils, and FC indicates inflammation in the gastrointestinal tract [32]. In recent years, FC has been actively used as a non-invasive and effective biomarker for predicting IBD [33]. The current recommended cutoff value for FC is less than 50 μg/g, but values vary considerably, with 20% of healthy children having FC levels exceeding 50 μg/g [34]. In addition, the diagnostic accuracy of IBD tends to be better when the cutoff value of FC is set at 100 μg/g rather than 50 μg/g [35]. Therefore, this study used a cutoff value of 100 μg/g. Based on this cutoff value, though the difference in the proportion of elevated FC between CD and UC patients was not significant, FC levels were elevated in 92.6% of CD patients and 87.5% of UC patients. FC levels can also contribute to other gastrointestinal diseases that cause inflammation, making it impossible to diagnose

IBD based solely on FC levels. However, the results of this study support that measuring FC levels is a useful metric when diagnosing IBD.

This study analyzed the nursing diagnoses of hospitalized patients newly diagnosed with IBD using the NANDA nursing diagnosis system. The nursing diagnoses given during the hospitalization of Korean pediatric IBD patients were primarily classified in the safety/protection domain with a focus on diagnoses related to infection and physical injury class. Many also fell under the comfort domain, specifically within the physical comfort class. Additionally, some were classified in the elimination and exchange domain, which addresses the gastrointestinal function class. These results indicate that, when caring for hospitalized patients newly diagnosed with IBD, nurses tend to focus on patient safety and protection, including addressing issues related to infection and physical injury and concerns about physical comfort and gastrointestinal function.

The five most frequent nursing diagnoses were as follows: the risk of infection with 725 occurrences (23.6%), acute pain with 615 occurrences (20.0%), diarrhea with 467 occurrences (15.2%), the risk of bleeding with 362 occurrences (11.8%), and dysfunctional gastrointestinal motility with 275 occurrences (9.0%). The risk of infection is considered a nursing issue that is typically applicable to all patients in a hospital setting, rather than being unique to pediatric patients with IBD. However, the risk of bleeding tends to be associated with complications that may arise after diagnostic and therapeutic endoscopic procedures. The remaining common nursing diagnoses, such as acute pain, diarrhea, and dysfunctional gastrointestinal motility, concern the physical symptoms associated with IBD. Although this study specifically targeted patients who were hospitalized, it is important to recognize that hospitalization itself can cause fear and anxiety in children, and the diagnosis of a chronic illness can have significant psychological and social implications for both the child and the child's family. In terms of comprehensive care, the low proportion of nursing diagnoses in the coping/stress tolerance domain of the NANDA system suggests the need to improve this area. Overall, this study sheds light on the nursing status of patients with IBD, providing valuable insights that can contribute to the development of comprehensive nursing strategies.

CONCLUSION

This study revealed a rise in the incidence of pediatric patients with IBD in Korea, and, in particular, a notable increase in CD. We also identified the unique clinical characteristics of pediatric IBD patients in Korea and compared the symptoms of CD and UC to enhance the existing understanding of the diagnoses in detail. These findings can help healthcare professionals better understand pediatric IBD patients and facilitate the early detection and treatment of the disease. However, it is important to note that this study is limited since it is a single-center study, and future large-scale national studies are needed to gain a more comprehensive understanding of these findings.

This study's unique contribution was its examination of nursing diagnoses given during the hospitalization of Korean pediatric IBD patients, an area that has received limited attention in the existing body of literature. By utilizing the NANDA system, which is an internationally standardized nursing diagnosis system, researchers and healthcare professionals can compare data and share findings with other studies that can be used in clinical practice, promoting consistency in research findings both domestically and internationally and fostering collaboration between professionals.

This study highlights the importance of a comprehensive approach in nursing care, addressing not only physical symptoms but also the psychological and social factors that affect pediatric patients hospitalized with IBD. The findings provide valuable insights with the potential to enhance clinical practice and improve patient outcomes in this specific population. However, it is important to note that the study's subjects were limited to hospitalized patients with an initial diagnosis of IBD, which may not fully represent the scope of nursing care for all pediatric IBD patients. Therefore, future research involving a larger and more diverse sample of pediatric IBD patients in Korea should be conducted to confirm and further expand upon the findings of this study.

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Authors' contribution

Conceptualization: all authors; Data collection, Formal analysis: Sung-Yoon Jo; Writing-original draft: all authors; Writing-review and editing: all authors; Final approval of published version: all authors.

Conflict of interest

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Data availability

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None.

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Supplement 1. Flowchart for Selecting Subjects for a Study on Clinical Characteristics and Nursing Diagnoses in Pediatric Patients with Inflammatory Bowel Disease.