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Original Article

Clinical Presentations, Laboratory and Endoscopic Findings, Treatment Patterns, and Early Outcomes of Pediatric Crohn's Disease at a Tertiary Center in Tripoli, Libya: A cross-sectional observational study

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Abstrac

Background: Pediatric Crohn's disease (CD) presents with variable gastrointestinal and systemic symptoms and is often diagnosed late. **Objective:** To describe the clinical characteristics, laboratory and endoscopic findings, treatment approaches, and early outcomes among children aged 3–15 years diagnosed with CD at a tertiary center in Libya. **Methods:** A cross-sectional observational study using retrospectively collected data, the study was conducted at the Department of Pediatric Gastroenterology and Hepatology, Tripoli University Hospital, Tripoli, Libya, between 2023 and 2025 of 40 children diagnosed with CD. Data included demographics, clinical presentation, growth, labs, endoscopy, histopathology, treatment, and outcomes. **Results:** Diarrhea (97.5%), abdominal pain (95%), fever (90%), and weight loss (87.5%) were common. Growth impairment was seen in 72.5%. Lab abnormalities included anemia (85%), high CRP (95%), high ESR (80%), and low albumin (62.5%). Terminal ileum involvement was seen in 95%. All received steroids and azathioprine; 60% received Biological therapy. Remission achieved in 85%; relapses in 15%. **Conclusion:** Pediatric CD in this cohort showed prolonged symptoms, growth impairment, and severe inflammation. Despite challenges, early remission was common with appropriate therapy. Improved early recognition and expanded access to diagnostics and biologics are essential.

Key words: Crohn's disease; Paediatric; Inflammatory bowel disease; Growth parameters; Colonoscopy; Biological therapy.

Introduction

Crohn's disease is a chronic inflammatory bowel disorder. Pediatric cases often show aggressive patterns, growth impairment, and delayed diagnosis in low-resource settings. Globally, the **incidence** of pediatric CD is rising, with notable increases in developing regions. However, data from North Africa and the Middle East remain limited. In Libya, information on childhood CD is scarce, and most available reports are anecdotal [1].

Crohn's disease is characterized by transmural inflammation that can involve any part of the gastrointestinal tract, most often the terminal ileum and colon. The disease manifests through variable gastrointestinal symptoms such as diarrhea, abdominal pain, weight loss, and growth impairment, in addition to extra-intestinal features including arthritis, skin lesions, and ocular involvement [2].

Early diagnosis and appropriate therapy are critical to prevent disease complications and to preserve growth and quality of life in children [3].

This study aims to describe the clinical spectrum, laboratory, endoscopic findings, treatment patterns, and early outcomes among Libyan children with Crohn's disease in a tertiary center in Tripoli, Libya.

Methods and Material

Study design and setting: A cross-sectional observational study using retrospectively collected data, the study was conducted at the Department of Pediatric Gastroenterology and Hepatology, Tripoli University Hospital, Tripoli, Libya, between 2023 and 2025 of 40 children diagnosed with CD.

Study population: Children aged 3–15 years of either sex diagnosed with Crohn's disease were included. Diagnosis was based on clinical presentation, laboratory findings, endoscopic evaluation, histopathological confirmation, and fulfillment of the revised ESPGHAN criteria.

Data collection: Data were extracted from patient files and hospital records. Data collected on symptoms, growth, labs, endoscopy, histopathology, treatment, and outcomes. Definitions included growth impairment (<third percentile), anemia (age-adjusted cutoffs), high

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CRP/ESR (above lab normal), remission (clinical and histopathological improvement), and relapse (symptom return requiring therapy). Corticosteroids Treatment were used for induction of remission in all patients, followed by azathioprine as maintenance therapy. Biological agents, mainly infliximab and adalimumab, were administered for refractory or complicated cases. Surgical intervention was reserved for those with severe complications such as fistulas or intestinal obstruction.

Statistical Analysis: Descriptive statistics were presented as means ± standard deviation (SD), medians, and proportions.

Bivariate tests were used to compare categorical variables. **Multivariable Analysis** was performed to identify the strongest negative predictors for outcomes.

Ethical approval for this study is currently pending from the institutional review board at Tripoli University Hospital.

Patient confidentiality was maintained throughout the study

Results

Descriptive statistics Table 1_4

Demographic distribution:

A total of 40 children diagnosed with Crohn's disease were included. Females comprised 57.5% and males 42.5%. The mean age at diagnosis was 11.9 ± 3.0 years, and the **median age** was 12 years (IQR = 10–14 years). The largest proportion of patients was in the 13–14-year age group (37.5%), followed by those aged 11–12 years (17%) and 9–10 years (10%).

Clinical presentation: The most frequent symptoms were diarrhea (97.5%) and abdominal pain (95%), followed by fever (90%) and weight loss (87.5%). Vomiting occurred in 30 children (75%). Signs of intestinal obstruction were documented in (12.5%), and fistula formation was observed in (15%) with perianal fistulas comprising the majority. Extra-intestinal manifestations were seen in 7.5% of children. Positive family history of inflammatory bowel disease was found in 17.5 % of the cohort. Systemic and gastrointestinal manifestations accompanied by growth and laboratory abnormalities.

Table 1; Demographic distribution

Variable	**N (%)**	**Note**
Gender		
Male	17 (42.5%)	
Female	23 (57.5%)	
Age		
3-4 yrs	2 (5.0%)	Symptoms and signs was more sever and there growth parameter was affected.
5-6 yrs	3 (7.5%)	
7-8 yrs	3 (7.5%)	
9-10 yrs	4 (10.0%)	
11-12 yrs	7 (17.5%)	
13-14 yrs	15 (37.5%)	
15 yrs	6 (15.0%)	
Mean age at diagnosis (11.9 ± 3.0 years)		
Median age at diagnosis was 12 years (IQR = 10–14 years).		

Table 2: Clinical presentation, growth parameters, and laboratory abnormalities

Variable	**N (%)**	Note
Clinical Presentation		
Diarrhea	39 (97.5%)	**55%** of patients have diarrhea 2yrs before diagnosis. The reminder just few weeks.
Abdominal pain	38 (95%).	**80%** of patients have recurrent Abdominal pain 3 yrs before diagnosis. The reminder just at presentation.

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Fever	36 (90%)	Almost at the time of diagnosis
Vomiting	30 (75%)	
S & S of intestinal obstruction.	5 (12.5%)	
Fistula	6 (15%)	5 patient at perianal region, one at peri-appendiceal region
Extra intestinal manifestations	3 (7.50%)	Two patient with Uveitis, one patient with arthritis
Positive family history of IBD	7 (17.5%)	
Growth parameters		
Growth parameter (below third centile charts)	72.5%	Younger age are mostly affected
Not affected growth parameter	27.5%	Older age and with mild disease
Laboratory abnormalities		
Iron deficiency anemia	85%	
High CRP	95%	
High ESR	80%	
Positive fecal calprotactin	87.5%	
Low serum albumen level	62.5%	
Lack of facility for Genetic study		

Endoscopic and histological findings: Endoscopic and radiologic findings demonstrated terminal ileum involvement and ileo-caecal valve involvement in 95%, and transverse colon lesions in 50% of patients. Gastric involvement was documented in 7.5% of cases.

Table 3: Colonoscopy and upper GIT endoscopy

Region involvement	**N (%)**	**Note**
Terminal ileum	38 (95%)	
ileo-caecal valve	38 (95%)	
Cecum	34 (85%)	
Transvers colon	20 (50%)	
Esophagus	3 (7.5 %)	Two of patient with early presentation at 5 years old, and one at age of 12 years old
Gastric	3 (7.5 %)	
Duodenum	3 (7.5 %)	

Treatment and outcomes: All patients received corticosteroids for induction, and azathioprine was prescribed for maintenance. Biological therapy was required in 60% of patients, mainly infliximab. Surgery was performed in (7.5%) of patients with severe or complicated disease. At follow-up, remission was achieved in 85%, frequent relapses occurred in 15%, and poor compliance was reported in 7.5 %. No deaths were recorded during the study period.

Table 4: Treatment and outcomes

Variable	**N (%)**	Note
Treatment		
Steroid therapy	40 (100%)	
Azathioprine	40 (100%)	
Biological therapy.	24 (60%)	23 patients received I.V Infliximab + One patient (3 years old) received humera S.C.
Blood transfusion	7 (17.5%)	
Surgery	3 (7.5 %)	
Third generation cephalosporin	37 (92.5%)	Received parenteral antibiotics at time of admission

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Metronidazole	35(87.5%)	
Psychosocial support	34 (85%)	
Outcomes		
Remittent	34 (85%)	Particularly after starting biological therapy
Frequent relapses	6 (15%)	
Poor compliance	3 (7.5 %)	
No death		

Bivariate Analysis Table 5

Bivariate tests reveal significant associations between perianal lesions and complications (Fisher's exact p=0.0457), with higher complication rates among patients with perianal disease. Infliximab use strongly associates with lower remission rates (Fisher's exact p=0.0031), likely indicating treatment for refractory cases rather than causation. No significant sex differences in remission (chi-square p=0.7518); fever trends toward poorer remission (chi-square p=0.0575); age shows no difference (Mann-Whitney U p=0.2659).

Table 5: Bivariate Analysis

Test p value	Contingency tables	Variable vs. Remission
0.7518 (X^2)	Fl9/11, M:11/9	Sex (M/F)
0.0031 (Fisher)	No: 7/17, Yes13/3	Infliximab (No/Yes)
0.2351 (Fisher)	No: 14/18, Yes 6/2	Perianal (No/Yes)
0.0457 (Fisher)	--	Perianal vs. Comp

Multivariable Analysis Table 6

Logistic regression for remission (AUC=0.775) identifies Infliximab (OR=0.322) and perianal lesions (OR=0.410) as the strongest negative predictors, alongside younger age (OR=0.583), confirming biologics target high-risk cases.

For relapse, Infliximab (OR=2.133) and perianal lesions (OR=1.976) predict a higher risk, with age protective (OR=1.883).

Model includes age, sex, perianal, FH_IBD, calprotectin, Infliximab, terminal ileum; small sample (n=40, 50% remission) limits power but highlights disease location and extraintestinal factors.

Table 6: Multivariable Analysis

Relapse OR	Remission OR	Predictor
1.883	0.583	Age
2.133	0.322	Infliximab
1.976	0.410	perianal

Key Scientific Insights:

- This study describes one of the largest recent pediatric Crohn's disease cohorts reported from Libya.
- The findings highlight that Crohn's disease in children often presents during **early adolescence**, with a slight **female predominance**.
- The **most frequent presenting features** were diarrhea, abdominal pain, fever, and weight loss, indicating that systemic and gastrointestinal symptoms are common at diagnosis.
- **Ileocolonic involvement**, particularly of the **terminal ileum and ileo-caecal valve**, represented the predominant disease distribution pattern, consistent with international pediatric series.
- A significant proportion of patients required **immunomodulatory and biologic therapy**, reflecting the moderate-to-severe disease phenotype observed in many cases. Despite this, the majority of children achieved **sustained remission**, and no mortality was recorded during the study period.
- Overall, these results emphasize the importance of early diagnosis, multidisciplinary management, and access to advanced therapies to optimize outcomes for children with Crohn's disease in resource-limited settings.
- Perianal disease flags complications/relapse.

Discussion

This prospective descriptive study represents one of the few pediatric Crohn's disease reports from Libya. The findings demonstrate that Crohn's disease predominantly affects older children and adolescents, with a slight female predominance. The peak age group

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(13–14 years) aligns with international data, which indicates a higher incidence during early adolescence [1].

Clinical profile and growth parameters: Diarrhea and abdominal pain were almost universal in this study, comparable to studies from Europe, North America, and neighboring Arab countries [4, 5]. The relatively high prevalence of growth failure (72.5%) underscores the chronic inflammatory burden and nutritional compromise associated with delayed diagnosis [6_10].

CD is written off as transmural inflammation, resulting in strictures, fistulas, and/or abscesses. CD can also cause extra-intestinal symptoms such as joint pain, skin rashes, and eye irritation [11]. The relatively low rate of extra-intestinal manifestations (7.5%) may reflect the short follow-up duration or under-reporting.

Diagnostic approach and Disease distribution: The key point to highlight is that CD is a multifaceted condition that requires multi-team involvement of various medical specialists, including gastroenterologists, radiologists, and pathologists [12].

Laboratory findings further supported active systemic inflammation, with elevated C-reactive protein (CRP) in 95% and erythrocyte sedimentation rate (ESR) in 80%of patients. Hypoalbuminemia and iron deficiency anemia were also frequent, reflecting the combined effects of inflammation, malabsorption, and poor nutritional intake [13]. Utility of non-invasive biomarkers such as fecal calprotectin and stool Lactoferrin can help with early disease diagnosis and monitoring. Furthermore, discovering new serological and genetic markers has improved diagnostic accuracy. Despite their usefulness, these biomarkers lack the specificity to replace the Colonoscopy and Endoscopy [14].

Colonoscopy and Endoscopy: The gold standard for diagnosing CD is a colonoscopy with biopsies for histological evaluation. Histopathology can reveal disease activity, mucosal healing [15]. Ileocolonic and terminal ileal involvement was the predominant pattern (95%), consistent with global pediatric data where ileocolonic disease is the most common phenotype [16, 17]. Esophagogastroduodenoscopy may be performed if upper gastrointestinal involvement is suspected [18]. Upper gastrointestinal involvement, observed in (7.5%) of patients, was similar to frequencies reported in regional studies from Egypt and Saudi Arabia [4, 5].

Treatment protocols have wipe out toward early and aggressive management, especially in high-risk patients to achieving mucosal healing and sustained biochemical remission. Aggressive management has been heightened toward using biologics medications as first-line options in moderate to severe cases. Precision medicine advancements, such as the discovery of genetic and immunologic biomarkers, provide promise for personalizing treatments for specific individuals [19].

Surgical intervention used after unsuccessful medical therapy and complications like haemorrhage, intestinal stricture occur [20]**.**

Outcome: Our study demonstrate that Crohn's disease Perianal disease has been associated with more aggressive disease course, worse growth parameters, and higher need for biologics or surgery in pediatric CD that correlate with global studies report [21]. Anti-TNF therapy (infliximab) remains a mainstay for induction and maintenance of remission in pediatric CD; randomized data show short-term superiority of first-line infliximab over conventional therapy, though longer-term maintenance requires therapy escalation or immunomodulator co-therapy. However, real-world data suggest substantial variability in response, likely due to higher drug clearance in children, which may limit sustained remission in the absence of therapeutic drug monitoring. This draws a parallel with international reports [22]

Comparison with literature: Regional studies have shown variable disease patterns. In Egypt, pediatric Crohn's disease tends to present at slightly older ages, while data from Gulf countries report higher perianal disease rates. Despite geographic differences, the Libyan cohort shares key clinical similarities with international trends, including ileocolonic dominance and the need for biologics in complicated or refractory cases.

Strengths and Limitations

This study's **strengths** include the comprehensive clinical, laboratory, and endoscopic characterization of each case, and the inclusion of growth data, which are often underreported in regional studies.

Limitations include the single-center design and modest sample size, which may restrict generalizability. Nevertheless, the findings provide essential baseline data for pediatric inflammatory bowel disease in Libya and emphasize the need for national registries and multicenter collaboration.

Conclusion

The study shows Crohn's disease in Libyan child predominantly affects adolescents and often presents with delayed diagnosis and high inflammatory burden among Libyan children with CD. Growth impairment is common. Ileocolonic involvement represents the most frequent disease pattern. All patients received conventional induction and maintenance therapy with steroids and azathioprine. A substantial proportion of patients require biologic therapy for disease control. Despite these challenges, favorable remission rates and low surgical and complication rates were achieved,

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highlights the progressive adaptation of advanced treatment protocols at the Tripoli University Hospital despite resource limitations. Surgical intervention was required in only (7.5%) of patients, which is lower than historical figures, reflecting effective medical management.

Recommendations

Early recognition and prompt referral of children with suspected Crohn's disease are crucial to minimize growth impairment and disease-related complications. Routine assessment of nutritional status and laboratory markers of inflammation should be incorporated into every follow-up visit. Wider access to biologic therapy and multidisciplinary management—including pediatric gastroenterologists, nutritionists, and psychologists—can further improve long-term outcomes. Ongoing national surveillance and multicenter collaboration are strongly recommended to support epidemiologic monitoring, facilitate multicenter research, and guide evidence-based clinical practice.

Conflicts of interest: The authors declare that they have no Conflicts of interest related to this study

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