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Original Research Article

Accuracy of fecal calprotectin and endoscopic narrow band imaging in the prediction of severity of inflammatory bowel diseases

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ABSTRACT

Background: Fecal calprotectin is a noninvasive and accurate marker of inflammatory bowel disease. In addition to aiding in diagnosis, it also predicts inflammatory bowel disease (IBD) relapses and the severity of the disease. Objectives of current study were evaluate the accuracy of Fecal calprotectin and Narrow band imaging for prediction severity in inflammatory bowel disease.
Methods: After informed written consent and ethical clearance, the study prospectively included 50 patients of IBD. Quantitative measurement of Calprotectin was done by ELISA kit (Eagle Biosciences, Nashua). Endoscopy activity was calculated using Narrow band imaging.
Results: Out of 50 patients, Males outnumbered the females with a ratio of 2.1. Increased frequency of stools was the most common symptom (94%). 39 (78%) patients had features ulcerative colitis while as 9 (18%) patients had features of Crohn's disease. Total of 42 (84%) patients had elevated levels of Fecal Calprotectin. The severity of IBDs increased significantly when the Fecal Calprotectin level rises (p value >0.05). The relationship between endoscopic and histological scores to detect disease severity in IBD was statistically insignificant (p value=0.85). The accuracy of the fecal calprotectin levels was found to be 84%, sensitivity 87.5%, and specificity was 50%. The positive and negative predictive values were 97.6% and 12.55% respectively. 47 (94%) patients received medical treatment. 3 (7.7%) patients of UC were subjected to surgical intervention.
Conclusions: Fecal calprotectin is a valuable and non-invasive marker with good sensitivity and specificity for the diagnosis, evaluation of the severity, and monitoring of IBD activity.

Key words: Faecal calprotectin, Colonoscopy, Narrow band imaging, Inflammatory bowel disease, Colitis

INTRODUCTION

Inflammatory bowel disease (IBD), which includes Crohn's disease (CD) and ulcerative colitis (UC), are charcterised by recurrent and remmiting of unpredictable duration. CD and UC are most commonly diagnosed in late adolescence and early adulthood, but the diagnosis may occur at all ages and the mean age ranged between 33.4 years and 45 years.[1] The aetiology is uncertain but, both UC and CD occur in individuals who may have genetic pedisposition and who ae exposed to environmental factors that trigger abnormal immune responses that lead to intestinal inflammation.[2]

Chron's disease may effect any part of gastrointestinal tract from mouth to anus, most typically the distal ileum, the anal canal, and the large bowel whereas Ulcerative Colitis is confined to large intestine.[2] Both the Ulerative

colitis and Chron's disease doesnot produce characteristic symtoms due to persistant inflammatory activity. Furher,early and accurate diagnosis of IBD is crucial for better treatment outcomes. However, none of the serological and fecal diagnostic biomarkers offer a stand-alone tool for practical evaluation, both for suspected and established IBD. IBD is diagnosed using a combination of clinical signs, inflammatory laboratory markers, imaging results, and endoscopic biopsies. Since endoscopy is invasive, there is a need for simple and noninvasive tools with which to monitor IBD activity and identify the presence of lesions. A number of surrogate markers have been proposed with the most specific being faecal calprotectin that accurately detects the activity and severity of disease. Further, it is easily available, accessible, and affordable markers for the poor patients in our settings. The aim of the present study was to assess the utility of faecal calprotectin and narrow band imaging in predecting the activity of IBD.

METHODS

This prospective observational study, of accuracy of fecal calprotectin and endoscopic narrow band imaging in prediction the severity of inflammatory bowel disease' was conducted in the department of surgery, Jawaharlal Nehru medical college & hospital, AMU, Aligarh, between December 2020 and November 2022.

After informed written consent, 50 patients of both sexes over the age of 18 years diagnosed with IBDs were included in the study. Patients of paediatric age group, patients who refused consent for an invasive procedure and patients with questionable IBD diagnosis were excluded. All patients underwent a thorough evaluation, including a history, clinical examination, baseline investigation, endoscopic examination, biopsy for histopathology and fecal calprotectin levels. The luminal contrast study and contrast enhanced tomography (CECT) scan of the abdomen were also performed in selected patients where the diagnosis was ambiguous.

The clinical symptoms and signs of all patients who met the inclusion criteria were formulated. The severity of stool frequency was classified as Mild (4 stools per day), Moderate (4 -6 stools per day), and Severe (>6 stools per day). Mucus in faeces was classified as present, absent, or mixed with blood.Blood in faeces was characterised as absent, present with a blood streak less than half of the time, obvious blood the majority of the time, or blood alone passing. The abdominal cramps, fever, tenesmus, and constipation were also included in the study population as present or missing. A general examination of the patient was performed in the form of general physical well-being, pallor, body mass index (BMI), clubbing, pulse rate, blood pressure, and temperature. Extra intestinal manifestation (EIM) features of IBD were documented in all subjects, including arthritis, ankylosing spondylitis, erythema nodosum, episcleritis, uveitis, and pyoderma gangrenosum. The abdomen was examined to rule out features of distension, tenderness, rebound tenderness, guarding, mass, and intestinal obstruction. The perianal area was examined to rule out peri-skin tags ,fissures, fistulas, or abscess formation. A digital rectal examination was performed to rule out an anal stricture or intraluminal growth.

All the patients were subjected to lower gastrointestinal endoscopy after proper preperation. Endoscopic biopsies was taken from multiple representative areas, collected in formalin containers and sent for histopathological examination in the department of pathology. We used the endoscopic assessment of severity using narrow-band imaging (NBI) in all patients with ulcerative colitis, and severity classification was done according to ulcerative colitis endoscopic index of severity (UCEIS). Endoscopic features used to classify CD into early and late stages. Patients with erythematous mucosa, superficial ulcers, and deep ulcers affecting less than 10% of the surface were classified as early-stage; while as patients with large deep ulcers, loss of mucosal layer, well-like ulcers and large mucosal abrasions were classified as late stages of CD. Simple endoscopic score for Chron's disease (SES-CD) scoring was done in every diagnosed Chron's Disease patient using Narrow band imaging (NBI) for the assessment of disease severity. The patients were informed that they would be required to furnish a faecal sample and were given a plastic container to do so. Their faecal samples were stored at -20°C in the Department of Biochemistry, until assayed. Quantitative measurement of Fecal Calprotectin was carried outby ELISA kit (Eagle Biosciences, Nashua).

Statistical analysis

The recorded data was compiled and entered in a spreadsheet (Microsoft Excel) and then exported to data editor of SPSS Version 20.0 (SPSS Inc., Chicago, Illinois, USA). Continuous variables were expressed as Mean±SD and categorical variables were summarized as frequencies and percentages.Independent t-test was used to compare the mean of different quantitative parameters of control and cases, p value <0.05 was considered as statistically significant in the present study.

RESULTS

Total of fifty patients were studied. Most of the patients were in the age group of 18-40 years (60%) followed by 40-60years (24%) (Table 1). 34 (68 %) were males and 16 (32%) were females with male: female ratio of 2:1 (Table 2). Most of the patients (34%) were nonsmokers. Only 16 (32%) of our patients had a smoking history.

Total 47 of our patients (94%) had increased frequency of stools. 32 (64%) of the patients had a history of mucus in their stools, and 46 (96%) of the patients had blood associated with stools. Mucus mixed with stools was present in 9 (18%) patients. 27 (54%) of the patients reported having abdominal cramps at the time of

defecation, while 10 (20%) patient reported history of fever in the past. Eight (16%) of our patients had inflammatory bowel disease related sequelae including, acute intestinal obstruction 2 (4%), perforation peritonitis 1 (2%), abdominal mass 2(4%) and malignancy in 3 (6%) patients. Only 3(6%) of our patients exibited extra-intestinal manifestations in the form of arthritis. None of our patients presented with toxic mega-colon.

Table 1: Age distribution of the patients.

Age (years)	N	%
18-40	30	60
40-60	12	24
60-80	8	16
Total	50	100
Mean=40.6 years		

On NBI, 39 (78%) of 50 patients had ulcerative disease, while 9 (18%) of our patients had Crohn's disease. Two (4%) of our patients had mild inflammatory changes on endoscopy and were histopathologically identified with non-specific colitis.

Table 2: Sex distribution of the patients.

Sex	N	%
Male	34	68
Female	16	32
Total	50	100

The severity of disease in patients with ulcerative colitis and Chron's disease was assessed using NBI. In ulcerative colitis patients, disease severity was assessed. On NBI, 21 (53.84%) patients had mild disease with Erythema, loss of vascular pattern, and fine granularity, 10 (25.6%) had moderate disease with marked erythema, coarse granularity, absent vascular markings, and contact bleeding, and only 7 (18%) patients had severe ulcerative colitis with Spontaneous Bleeding and Ulcerations. Of Chron's disease patients, 4 (44.44%) had mild disease and 9 (55.56%) has moderate illness. None of our patient has severe CD. After endoscopy, faecal calprotectin was assessed in all patients as an marker of IBD. Fecal calprotectin levels of 50 ug/g were regarded as normal. Fecal Calprotectin levels were elevated in 34 (87.18%) of the 39 patients with ulcerative colitis and in 7 (77.78%) of the 9 patients with Crohn's disease.

Fecal Calprotectin level of >50 ug/g was observed in 42 (84%) patients, only 41 (82%) patient were proven to be IBD while as one patient had non-specific colitis. 8 (16%) patients had fecal calprotectin levels below 50 ug/g out of which 7 (14%) proved to be IBD and one has non-specific features. The faecal calprotectin levels were determined to be 84% accurate. The Fecal calprotectin had an 87.5% sensitivity and specificity of 50%. The positive and negative predictive values were 97.6% and 12.55% respectively. In our study, 15 (30%) of patients had FC levels between 50 and 200 ug/g, 15 (30%) had levels between 201 and 400 ug/g, 8 (16%) had levels below 50 ug/g, and 12 (24%) had levels over 400 ug/g. The mean fecal calprotectin level was discovered to be 210.18 ug/g. The severity of IBDs increased significantly when the fecal calprotectin level rises (p value >0.05). In 47 (97%) of the individuals who presented with clinical symptoms of IBD, endoscopic biopsy were taken and sent for histology. In the same subject, more than one histological characteristic was found. Mucosal surface modification was the most common feature in UC patients 39 (100%), followed by crypt distortion 20 (51%). Mucosal atrophy was detected in 18 patients (46%), mucin depletion in 17 patients (44%), crypt abscess in 13 patients (33%), lymphoplasmacellular infiltration in 8 patients (20%), and basal plasma cell infiltration in 4 patients (10%). 7 (78%) Crohn's disease patients showed localised crypt distortion, 4 (44%) had deep ulcers, 2 (22%) had mucin depletion, and 1 (11%) had focal Cryptitis. Two (4%) patients with non-specific colitis demonstrated mild mucosal alteration, including neutrophilic infiltrates in the mucosa and submucosa, which were not consistent with UC or CD.

The three main histological components that were evaluated for histopathological grading in UC are acute inflammatory cell infiltrate, chronic cell infiltrate, and ulceration. 2 out of 39 (5.13%) of patients had no histological disease, 18 out of 39 (46.15%) had mild disease, 10 out of 39 (25.64%) had moderate disease, and 9 out of 39 (23.07%) had severely active disease. When NBI and histology were used to detect disease severity, 1 (2%) patient had NBI evidence of remission and 2 (5.13%) patients had histological evidence of remission. Whereas 21 patients (53.84%) exhibited minor illness on NBI, only 18 patients (46.15%) had mild disease on histology. On histology, all 10 (25.64%) of the NBI patients with moderate disease had identical characteristics. NBI demonstrated severe disease in 7 (17.94%) of the cases, while histology revealed severe sickness in 9 (23.07%). The relationship between endoscopic and histological scores was statistically insignificant (P value = 0.85) (Table 3).

When histology and faecal calprotectin levels were compared to determine disease severity, 2 (5.13%) patients exhibited histological evidence of remission, whereas 5 (12.82%) patients had FC levels suggestive of remission. Whereas 18 (46.15%) patients showed mild illness on histology, only 13 (33.33%) had mild disease on the FC levels. According to histology, 17 (43.595%) of the patients had moderate disease, compared to 10 (25.64%) on FC levels. Histology revealed severe illness in 9 (23.07%) patients, although FC level indicated severe disease in just 4 (10.26%) patients. The relationship between FC level and histopathological score in identifying UC disease severity was statistically insignificant (p value =0.85) (Table 3).

The accuracy of the fecal calprotectin levels was found to 84%. The sensitivity of the Fecal calprotectin was 87.5%, and Specificity was 50%. The positive and negative

predictive values were 97.6% and 12.55% respectively. Total of 47 (94%) patients in our study received medical treatment. 3 (7.7%) patients of UC were subjected to surgical intervention. None of our patients developed any major surgical complication. Mesalamine was given in 41 (82%) patients and corticosteroids were given in 6 (12%) patients. All the patients responded well with the medical treatment. All the patients are on regular follow-up.

Table 3: Correlation between NBI, FC levels and histopathological scores in IBDs patients.

Classification	NBI	%	FC level	%	Histopathology	%
Remission	3	6	8	16	4	8
Mild	25	50	15	30	21	21
Moderate	15	30	15	30	16	16
Severe	7	14	12	30	9	9
Total	50	100	50	100	50	100

DISCUSSION

Inflammatory bowel disease (IBD), which includes Crohn's disease (CD) and ulcerative colitis (UC), is a recurrent and remitting gastrointestinal inflammatory illness. Ulcerative colitis is a disease of rectum and colon with extra-intestinal manifestations while as Crohn‘s disease can involve multiple sites of gastrointestinal tract.[3] Although the pathogenesis of IBD is not entirely understood, interplay of genetic, epigenetic, immunological, and environmental variables appears to play a critical role. Because of the mystery and complexity of IBD pathogenesis, there is no single diagnostic tool and, more importantly, no effective medication. Furthermore, the wide clinical presentation of both Crohn's disease and Ulcerative Colitis complicates identification, particularly in our settings like India, where tuberculosis and other non-specific bowel disorders are frequent. A comprehensive approach of clinical, biochemical, endoscopic, and histological features can aid in the evaluation of IBD patients. While endoscopy remains the gold standard for diagnosing and monitoring therapy response, it is an intrusive method that risks intestinal perforation and is poorly accepted by patients. Additionally, it is not widely available, necessitating both costly equipment and a skilled endoscopist. As a result, extensive research is done to find surrogate indicators that enable a non-invasive, affordable, but similarly precise evaluation of gut mucosa. Biological biomarkers are measurable biological events than can occur during the progression of IBDs. Autoimmune and antimicrobial antibodies play an adjuvant role in diagnosis of IBD.[4] Serum C-reactive protein (CRP) can help predicts IBD relapses.[4] Similarly, Fecal Lactoferrin and Calprotectin are reasonably accurate and non-invasive measures of disease activity, can predict relapses and identify high risk group among acute colitis patients.[4] Fecal calprotectin (FC) is a 36-kDa calcium and zinc-binding cytosolic protein, released extracellularly by stimulated neutrophils or released by cell disruption or death and acts as surrogate marker in the intestinal mucosa. It has been proposed as a noninvasive surrogate marker of intestinal inflammation in IBD and has a satisfactory diagnostic precision for the differentiation of organic and functional intestinal diseases and for optimizing the use of endoscopic procedures.[5] The present study entitled accuracy of fecal calprotectin and endoscopic narrow band imaging in prediction of severity of inflammatory bowel diseases‘‘ included total of 50 patients and was carried out in the department of surgery, JNMCH ,Aligarh over a period of 2 years. The primary aim of the study was to determine the efficacy of Fecal Calprotectin as a marker and endoscopic Narrow Band Imaging as imaging in determining disease severity and diagnosis.

In the study, most of the patients were between 18-40 years of age. The mean age was 40.6years. Ulcerative colitis is most commonly seen 20-40 years of age and peak age of Chronic disease occurrence is 20-30years of age.[3-6] Based on population level data from 16 Western countries, women are at lower risk of CD than men until puberty, at which point the reverse occurs, with women at higher risk.[7] Generally speaking, males and females demonstrated similar incidence of UC before age 45; however, above age 45 years, males demonstrated higher risk of incident UC than females. Using a similar analytical approach to population-based data from 12 Asia-Pacific countries, the authors showed that CD risk is male-dominated.[8] Moreover, in contrast to the Western population, from adolescence had a predominance of UC until age 65, after which the UC incidence in men and women was similar. In our study, most of the patients in the study were males. In the current study, 34 (68 %) were males and 16 (32%) were females. The male:female ratio was 2:1. According to the research by Baumgart et al smoking has a protective effect on UC and is linked to a less severe form of Chron's disease.[9] Some of the reasons given include smoking's impact on intestinal barrier function and its increased mucus production. In the present study, we discovered that 34% of the patients were nonsmokers. Only 16 (32%) of our patients had history of smoking.

Many clinical and pathological aspects of CD and UC are heterogeneous. They can be distinguished by the location and type of inflammation. Unlike UC, which affects only the mucosa of the colon, CD can affect any region of the gastrointestinal tract.[10] Both illnesses have clinical symptoms such as extra-intestinal presentation, however only UC is associated with hematochezia and passage of mucus or pus. Fistulas, perianal disease, and colonic and

small intestinal blockage are also common in CD patients. Cryptitis and crypt abscesses are seen in both UC and CD, although the crypt architecture in UC is more deformed.[11] Relapsing intestinal inflammation is seen in both UC and CD. According to Hendrickson et al the most persistent hallmark of UC is the presence of blood and mucus mixed with the stool, which is accompanied by abdominal cramps.[12] Because the sight of coarse blood in the stool alerts people to a gastrointestinal condition, UC is usually identified sooner than CD. Unlike UC, symptoms in CD are often subtle, delaying diagnosis. Gastrointestinal symptoms vary depending on the site, extent, and severity of the lesion. Patients with ileocolonic involvement usually have postprandial abdominal pain, and gastroduodenal CD presents with early satiety, nausea, vomiting, epigastralgia, or dysphagia. Extensive small bowel disease can cause diffuse abdominal pain, anorexia, diarrhoea, and weight loss, leading to lactose malabsorption. Colonic CD can mimic UC and present with diarrhoea containing blood and mucus associated with crampy abdominal pain, often relieved by defecation. Peri-anal disease is common, as are rectal appendages, deep anal fissures, and fistulas.[12]

In the current study, stool frequency increased in 47 patients (94%). Thirty-two (64%) patients had a history of mucus in their stools, and 46 (96%) patients had blood-stained stools. Mucus mixed with stool was found in 9 (18%) of these patients. Abdominal cramps during defecation occurred in 27 (54%) patients, while 10 (20%) patients reported a history of fever. Extra-intestinal manifestations (EIMs) affect 25-40% of IBD patients.[13] Aghazadeh and colleagues discovered that 31.4% of UC patients and 40.4% of CD patients had one of the five major EIMs and a smaller percentage of patients had more than one major EIM.[14] Musculoskeletal pain is the most common EIM, affecting 9-53% of IBD patients.[13,14] In our study, only 3(6%) of our patients presented with extraintestinal manifestations in the form of arthritis. Endoscopy is extremely important in the diagnosis, management, and treatment of inflammatory bowel disease (IBD). Endoscopy is essential in ruling out other causes, establishing diagnosis, distinguishing Crohn's disease (CD) from ulcerative colitis (UC), monitoring disease activity and response to treatment, and assessing and treating complications. Endoscopic ultrasound, capsule endoscopy, and balloon-assisted enteroscopy have expanded the role of endoscopy in IBD. Endoscopic findings in UC include edema, vascularity loss, erythema, mucosal granularity and friability, erosions, and ulcers, and pseudo polyps. These findings typically begin at the rectum and extend proximally in a continuous manner, with a gradual transition to normal appearing mucosa in treatment naive patients.[15] It is important to note that UC patients who are receiving treatment may experience patchy inflammation and rectal sparing.[16] While many of the classic findings of UC can also be seen in CD, the presence of aphthous ulcers, cobble stoning, and discontinuous or "skip" lesions are three major endoscopic findings that can help distinguish CD from UC.[17] Although isolated terminal ileum involvement is highly suggestive of CD, "backwash ileitis" can occur in UC in the setting of pancolitis.[18] In our study, 39 (78%) patients had features of ulcerative disease, whereas 9 (18%) of patients had features of Crohn‘s disease.[19]

Histological examination of endoscopic biopsies is an important step in the diagnostic workup of patients with suspected IBD patients and it is crucial in making a final diagnosis, particularly in differentiating between UC and CD and other forms of non-IBD colitis.[19] UC classically shows diffuse and continuous chronic inflammation involving the rectum and spreading proximally, with gradually decreasing severity.[19] The transition between adjacent involved and healthy mucosa is sharp. The mucosa has a friable, granular appearance which can progress to mucosal denudation or deep penetration; the initially superficial ulcers, in severe or longstanding disease, may reach the muscularis mucosae.[20] Extensive ulceration with sparing of mucosal islands may give rise to inflammatory pseudo polyps. In CD, gross examination of resected specimens reveals a discontinuous pattern of inflammation, with affected areas frequently and abruptly separated by areas of unaffected bowel(skip lesions).The serous surface of affected intestinal segments is often hyperaemic and may be covered with inflammatory exudate, and serous adhesions may develop with prolonged disease.[19] In CD, adipose tissue extends from the anti-mesenteric surface toward the intestinal section, a finding termed 'fat wrap' or 'creeping fat‘. The earliest grossly visible mucosal lesions are small aphthous ulcer, which usually occur along the mesenteric border of the intestinal wall (above the lymphoid follicles) and adjacent to normal mucosa.[21] Aphthous ulcers coalesce to form large, deep, tortuous or linear ulcers with an overhanging oedematous mucosal rim, giving the typical "cobblestone" appearance.[19] Fistulas are more common in the small intestine, but can also occur relatively rarely in the large intestine. However, free perforations are rare. The intestinal wall thickens and stiffens as a result of transmural inflammation with fibrosis and fibromuscular hyperplasia.[19]

In the present study, multiple histopathological features were present in the same patient. Mucosal surface alterations were the most common feature in UC patients, occurring in 39 (100%) subjects, followed by crypt distortion in 20 (51%). Fecal Calprotectin is a highly sensitive marker of gastrointestinal inflammation and helps distinguish between Inflammatory Bowel Disease (IBD) and irritable bowel syndrome (IBS). Fecal calprotectin is used to diagnose IBD, monitor disease activity, guide treatment and predict disease recurrence and post-operative recurrence. An additional advantage of fecal calprotectin is that changes in its levels are good indicators of mucosal healing or recurrence of inflammation.[20-23] Therefore, fecal calprotectin can be used to monitor patients with IBD and identify those at risk of recurrence. Fecal Calprotectin was measured in all the patients after endoscopy as marker of IBD. Overall, 42

(84%) patients had elevated levels of Fecal Calprotectin. 34 (87.18%) patients out of 39 of ulcerative colitis had raised fecal Calprotectin levels while as 7 (77.78%) out of 9 patients of Crohn‘s disease had raised Fecal Calprotectin levels. The mean FC value was 210.18 µg/g. The accuracy of the faecal calprotectin levels was found to 84%. The sensitivity of the Faecal calprotectin was 87.5%, and Specificity was 50%. The positive and negative predictive values were respectively 97.6% and 12.55%.

Medications such as aminosalicylates, corticosteroids, immunomodulators, and biologics are used to control symptoms of IBD. The treatment also includes other general measures like patient education and surgical resection in selected cases if necessary. Currently, pharmacological intervention is main stay for IBD treatment. Aminosalicylates, Corticosteroids, immunomodulators, biologics, and oral small molecules are the most common medications.[24] Total of 47 (94%) patients in the current study received medical treatment in the form mesalamine and corticosteroids. Mesalamine was given in 41 (82%) patients and corticosteroids were given in 6 (12%) patients. All the patients responded well with the medical treatment. Surgery in the form of stricturoplasty, colectomies and Restorative proctocolectomy with an ileal pouch-anal anastomosis is still an important means for IBD treatment in refractory and complicated cases. In recent years, the rate of surgery for CD has decreased from 10 to 8.8% ($p<0.001$), and that for UC has decreased from 7.7 to 7.5% ($p<0.001$).[3] Approximately 20% of UC patients will require surgery at some point during their disease's progression. After a disease duration of 10 years, the rate of colectomy is approximately 16%. Unlike Crohn's disease, UC is primarily curable surgically because it affects only the colon and rectum.[8] Restorative proctocolectomy with an ileal pouchanal anastomosis represents the surgical treatment of choice.[8] Large studies show a postoperative complication rate of around 30% and a low mortality of 0.1% for this procedure. Chronic pouchitis is one of the main factors limiting the surgical success of curing UC.[8] In the current study, 47 (94%) patients in our study received medical treatment and 3 (7.7%) patients of UC were subjected to surgical intervention. All the patients are on regular follow-up.

Limitations

This study included a smaller number of patients and therefore, for proper validation of these conclusions a long-term prospective clinical study with large sample is required.

CONCLUSION

Fecal Calprotectin is a valuable and non-invasive marker with good sensitivity and specificity for the diagnosis, evaluation of the severity, and monitoring of IBD activity. The severity of IBDs increased significantly when the Fecal Calprotectin level rises.

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REFERENCES

1. Loftus EV, Schoenfeld P, Sandborn WJ. The epidemiology and natural history of Crohn's disease in population-based patient cohorts from North America: a systematic review. Aliment Pharmacol Ther. 2002; 16(1):51-60.
2. Williams N, Ronan O’Connell P, McCaskie A. The pancreas. In: Bailey & Love’s Short Practice of Surgery. 28th ed. Boca Raton, FL: CRC Press; 2023: 1318-34.
3. Prantera C, Cottone M, Pallone F. Mesalamine in the treatment of mild to moderate active Crohn‘s ileitis, results of a randomised multicenter trial. Gastroenterology. 1999;116:521-6.
4. Pithadia AB, Jain S. Treatment of inflammatory bowel disease (IBD). Pharmacol Rep. 2011;63(3):629-42.
5. Wahl C, Liptay S, Adler G, Schmid RM. Sulfasalazine, a potent and specific inhibitor of nuclear factor kappa B. J Clin Invest. 1998;101:1163-74.
6. Present DH, Rutgeerts P, Targan S, Hanauer S, Mayer L, Hogezand R, et al. Infliximab for the treatment of fistulas in patients with Crohn‘s disease. New Eng J Med. 1999;340:1398-405.
7. Kühn F, Klar E. Surgical principles in the treatment of ulcerative colitis. Viszeralmedizin. 2015;31(4):246-50.
8. Gajendran M, Loganathan P, Catinella AP, Hashash JG. A comprehensive review and update on Crohn‘s disease. Dis Mon. 2018;64:20-57.
9. Baumgart DC, Carding SR. Inflammatory bowel disease: cause and immunobiology. Lancet. 2007; 369(9573):1627-40.
10. Zhang YZ, Lee SH, Kwon JE, Cho ML. Immunological pathogenesis of inflammatory bowel disease. Intest Res. 2018;16(1):26-42.
11. Baumgart DC, Sandborn WJ. Inflammatory bowel disease: clinical aspects and established and evolving therapies. Lancet. 2007;369(9573):1641-57.
12. Hendrickson BA, Gokhale R, Cho JH. Clinical aspects and pathophysiology of inflammatory bowel disease. Clin Microbiol Rev. 2002;15(1):79-94.
13. Bernstein CN, Blanchard JF, Rawsthorne P, Yu N. The prevalence of extraintestinal diseases in inflammatory bowel disease: a population-based study. Am J Gastroenterol. 2001;96:1116-22.
14. Aghazadeh R, Zali MR, Bahari A, Amin K, Ghahghaie F, Firouzi F. Inflammatory bowel disease in Iran: a review of 457 cases. J Gastroenterol Hepatol. 2005;20: 1691-5.

15. Waye JD. The role of colonoscopy in the differential diagnosis of inflammatory bowel disease. Gastrointest Endosc. 1977;23:150-4.
16. Bernstein CN, Shanahan F, Anton PA, Weinstein WM. Patchiness of mucosal inflammation in treated ulcerative colitis: a prospective study. Gastrointest Endosc. 1995;42:232-7
17. Pera A, Bellando P, Caldera D, Ponti V, Astegiano M, Barletti C, et al. Colonoscopy in inflammatory bowel disease. Diagnostic accuracy and proposal of an endoscopic score. Gastroenterology. 1987;92:181-5.
18. Haskell H, Andrews CW, Reddy SI, Dendrinos K, Farraye FA, Stucchi AF, et al. Pathologic features and clinical significance of backwash‖ ileitis in ulcerative colitis. Am J Surg Pathol. 2005;29:1472-81.
19. Bernstein CN, Shanahan F, Anton PA, Weinstein WM. Patchiness of mucosal inflammation in treated ulcerative colitis: a prospective study. Gastrointest Endosc. 1995;42:232-7.
20. Jess T, Rungoe C, Peyrin-Biroulet L. Risk of colorectal cancer in patients with ulcerative colitis: a meta-analysis of population-based cohort studies. Clin Gastroenterol Hepatol. 2012;10:639-45.
21. Laine L, Kaltenbach T, Barkun A, McQuaid KR, Subramanian V, Soetikno R. SCENIC Guideline Development Panel. SCENIC international consensus statement on surveillance and management of dysplasia in inflammatory bowel disease. Gastroenterology. 2015;148:639-51.
22. Vaos G, Kostakis ID, Zavras N, Chatzemichael A. The role of calprotectin in pediatric disease. Biomed Res Int. 2013;2013:542.
23. Däbritz J, Musci J, Foell D. Diagnostic utility of faecal biomarkers in patients with irritable bowel syndrome. World J Gastroenterol. 2014;20:363-75.
24. Cai Z, Wang S, Li J. Treatment of inflammatory bowel disease: a comprehensive review. Front Med. 2021;8: 765.

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