

ANORECTAL MANOMETRY PROFILE IN PATIENTS OF INFLAMMATORY BOWEL DISEASE PRESENTING TO TERTIARY CARE CENTRE IN SOUTH INDIA

Medical Gastroenterology

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ABSTRACT

Background: Inflammatory bowel disease (IBD) may be associated with persistent anorectal symptoms despite controlled intestinal inflammation. Anorectal manometry (ARM) provides objective assessment of sphincter function, rectal sensation, and defecatory coordination. However, data regarding anorectal dysfunction among Indian patients with IBD remain limited. **Methods:** A hospital-based cross-sectional observational study was conducted among 50 patients with confirmed IBD at a tertiary care centre in South India. Patients with ulcerative colitis (UC) in remission or mild disease activity and Crohn's disease (CD) with colonic involvement were included. Demographic and clinical characteristics were recorded, and all participants underwent standardized ARM. Resting and squeeze pressures, rectal sensory thresholds, rectoanal coordination, dyssynergic defecation, and balloon expulsion were assessed. Associations between clinical symptoms, disease duration, and ARM abnormalities were analyzed. **Results:** Of 50 patients, 29 (58.0%) had UC and 21 (42.0%) had CD. Stool frequency was significantly higher in CD than UC (3.14 ± 0.91 vs. 2.45 ± 0.57 /day; $p=0.003$). Overall anorectal dysfunction was present in 37 (74.0%) patients. Rectal hypersensitivity and impaired rectoanal coordination were observed in 46.0% each, while dyssynergic defecation occurred in 6.0%. Urgency was associated with rectal hypersensitivity and impaired coordination ($p<0.001$). Disease duration positively correlated with the number of abnormal ARM parameters ($r=0.412$, $p=0.003$), while stool frequency also showed a positive correlation ($r=0.368$, $p=0.009$). **Conclusion:** Anorectal dysfunction was common among patients with IBD, with predominantly sensory and coordination abnormalities. Longer disease duration and increased stool frequency were associated with greater ARM abnormalities, highlighting the potential value of physiological assessment in persistent anorectal symptoms.

KEYWORDS

Anorectal manometry; Inflammatory bowel disease; Ulcerative colitis; Crohn's disease; Anorectal dysfunction

INTRODUCTION

Inflammatory bowel disease (IBD), encompassing ulcerative colitis (UC) and Crohn's disease (CD), is a chronic relapsing disorder of the gastrointestinal tract that frequently produces debilitating symptoms beyond visible mucosal inflammation (Kaplan & Windsor, 2021; Ng et al., 2017). Patients frequently report elevated stool frequency, severe fecal urgency, tenesmus, fecal incontinence, constipation, and incomplete rectal evacuation (Nigam et al., 2018; Perera et al., 2013). These symptoms can persist even during endoscopic mucosal healing or clinical remission, pointing to underlying neuromusculoskeletal disturbances in rectal compliance, visceral sensation, and pelvic floor coordination (Nigam et al., 2018).

Earlier manometric investigations in UC have identified heightened rectal sensitivity, lower distension thresholds, and compromised compliance during active bouts (Brochard et al., 2015; Loening-Baucke et al., 1989; Suzuki & Fujioka, 1982). Although resting and voluntary squeeze pressures are often preserved, structural remodeling of the rectal wall and myenteric plexus can drive persistent tenesmus and frequency (Brochard et al., 2015). Although remission partially normalizes rectal tone, subclinical dysfunction regularly persists (Gravina et al., 2022). In CD, functional anorectal derangements can occur even without active rectal ulcerations, manifesting as impaired rectoanal inhibitory reflexes (RAIR) and dyssynergia (Litta et al., 2021; Rezaie et al., 2018).

Anorectal manometry (ARM) provides quantitative physiological assessment of sphincter pressures, rectal perception thresholds, rectoanal reflexes, and expulsion mechanics (Nigam et al., 2018). Because data from South Asian populations remain scarce, this study aimed to define the anorectal manometric patterns and functional pelvic floor phenotypes in patients with IBD attending a tertiary care hospital in South India.

MATERIALS AND METHODS

Study Design and Setting

This hospital-based cross-sectional observational study was conducted in the Department of Medical Gastroenterology, Gandhi Medical College and Gandhi Hospital, Secunderabad, Telangana, over a period of 18 months after obtaining approval from the Institutional Ethics Committee.

Study Participants: A total of 50 consecutive eligible patients with confirmed inflammatory bowel disease (IBD) were recruited after written informed consent was obtained. The participants were categorized into ulcerative colitis (UC) and Crohn's disease (CD) groups.

Inclusion and Exclusion Criteria

Patients aged 18–65 years with UC in remission or mild disease activity and patients with CD with colonic involvement and a Crohn's Disease Activity Index below 150 were included. Patients with moderate-to-severe disease, active perianal CD, previous anorectal or ileal surgery, history of vaginal delivery, celiac disease, or exocrine pancreatic insufficiency were excluded.

Data Collection and Assessment

Demographic and clinical information was recorded using a structured case record form. Laboratory investigations and colonoscopy were performed to confirm the diagnosis and assess disease activity.

Anorectal Manometry: Eligible participants underwent standardized anorectal manometry in the left lateral position. Resting and squeeze anal pressures, rectoanal inhibitory reflex, rectal sensory thresholds, rectoanal coordination, and dyssynergic defecation patterns were assessed using standardized maneuvers and graded balloon distension.

Statistical Analysis: Data were analyzed using SPSS. Continuous variables were expressed as mean $\pm$ standard deviation or median with interquartile range, while categorical variables were expressed as frequencies and percentages. A p -value <0.05 was considered statistically significant.

RESULTS

The cohort comprised 50 patients, with 29 (58.0%) having UC and 21 (42.0%) having CD. Age, sex, and disease duration were comparable between groups. Stool frequency was significantly higher in CD than UC (3.14 ± 0.91 vs. 2.45 ± 0.57 /day; $p=0.003$) (Table 1).

Table 1. Baseline Demographic, Disease Subtype, and Bowel Habit Characteristics of Patients with Inflammatory Bowel Disease (n=50)

Characteristic	Overall Cohort (n=50)	Ulcerative Colitis (n=29)	Crohn's Disease (n=21)	p-value ^a
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Age group (years), n (%)				0.719 ^b
<20	2 (4.0)	2 (6.9)	0 (0.0)	
21–40	22 (44.0)	13 (44.8)	9 (42.9)	
41–60	19 (38.0)	11 (37.9)	8 (38.1)	
>60	7 (14.0)	3 (10.3)	4 (19.0)	
Gender, n (%)				0.146 ^b
Male	32 (64.0)	21 (72.4)	11 (52.4)	
Female	18 (36.0)	8 (27.6)	10 (47.6)	
Disease duration (years), n (%)				0.512 ^b
<1	9 (18.0)	7 (24.1)	2 (9.5)	
1–3	19 (38.0)	11 (37.9)	8 (38.1)	
4–6	13 (26.0)	7 (24.1)	6 (28.6)	
>6	9 (18.0)	4 (13.8)	5 (23.8)	
Disease phenotype / subtype, n (%)				—
UC - Proctitis	11 (22.0)	11 (37.9)	—	
UC - Left-sided colitis	5 (10.0)	5 (17.2)	—	
UC - Extensive colitis	7 (14.0)	7 (24.1)	—	
UC - Pancolitis	5 (10.0)	5 (17.2)	—	
UC - Proctosigmoiditis	1 (2.0)	1 (3.4)	—	
CD - Colitis	10 (20.0)	—	10 (47.6)	
CD - Ileocolitis	11 (22.0)	—	11 (52.4)	
Stool frequency (per day), mean ± SD	2.74 ± 0.79	2.45 ± 0.57	3.14 ± 0.91	0.003 ^c

- ^a Comparison between Ulcerative Colitis and Crohn's Disease.
- ^b Calculated using Pearson Chi-square test; values expressed as number (n) and column percentage (%).
- ^c Calculated using Independent Samples t-test; values expressed as mean ± standard deviation (SD).

Abbreviations: CD, Crohn's disease; n, number of subjects; SD, standard deviation; UC, ulcerative colitis.

Stool urgency and rectal bleeding were significantly more frequent among UC patients, whereas constipation and incomplete evacuation were significantly more common in CD. Fecal incontinence and abdominal pain showed no significant intergroup differences (Table 2).

Table 2. Comparative Clinical Symptom Profiles Between Ulcerative Colitis and Crohn's Disease Patients (n=50)

Clinical Symptom	Overall Cohort (n=50) n (%)	Ulcerative Colitis (n=29) n (%)	Crohn's Disease (n=21) n (%)	p-value ^a
Stool urgency	19 (38.0)	15 (51.7)	4 (19.0)	0.019 ^b
Fecal incontinence	5 (10.0)	3 (10.3)	2 (9.5)	0.928 ^b
Constipation	8 (16.0)	2 (6.9)	6 (28.6)	0.042 ^b
Incomplete evacuation	15 (30.0)	5 (17.2)	10 (47.6)	0.022 ^b
Abdominal pain	29 (58.0)	14 (48.3)	15 (71.4)	0.103 ^b
Blood in stools	16 (32.0)	13 (44.8)	3 (14.3)	0.025 ^b

- ^a Comparison of clinical symptom prevalence between Ulcerative Colitis and Crohn's Disease.
- ^b Calculated using Pearson Chi-square test / Fisher's exact test as appropriate; values expressed as number (n) and percentage (%).

Abbreviations: CD, Crohn's disease; n, number of subjects; UC, ulcerative colitis.

Resting and maximum squeeze pressures, rectal sensation categories, first sensation volume, and urge sensation volume showed no significant differences between UC and CD. Nearly half demonstrated rectal hypersensitivity, while reduced squeeze pressure was common overall (Table 3).

Table 3. Anorectal Manometric Sphincter Pressures and Sensory Threshold Volumes in Study Patients (n=50)

Manometric Parameter	Overall Cohort (n=50)	Ulcerative Colitis (n=29)	Crohn's Disease (n=21)	p-value ^a
Resting anal pressure, n (%)				0.328 ^b
Normal	30 (60.0)	18 (62.1)	12 (57.1)	
Reduced	16 (32.0)	10 (34.5)	6 (28.6)	
Increased	4 (8.0)	1 (3.4)	3 (14.3)	

Maximum squeeze pressure, n (%)				0.442 ^b
Normal	24 (48.0)	15 (51.7)	9 (42.9)	
Reduced	25 (50.0)	14 (48.3)	11 (52.4)	
Increased	1 (2.0)	0 (0.0)	1 (4.8)	
Rectal sensation category, n (%)				0.668 ^b
Normal	23 (46.0)	12 (41.4)	11 (52.4)	
Hypersensitivity	23 (46.0)	15 (51.7)	8 (38.1)	
Hyposensitivity	4 (8.0)	2 (6.9)	2 (9.5)	
Rectal sensory thresholds (mL), mean ± SD				
First rectal sensation volume	34.16 ± 13.65	33.14 ± 13.02	35.57 ± 14.71	0.552 ^c
Urge sensation volume	71.32 ± 16.98	68.72 ± 15.89	74.90 ± 18.21	0.228 ^c

- ^a Comparison between Ulcerative Colitis and Crohn's Disease.
- ^b Calculated using Pearson Chi-square test; values expressed as number (n) and percentage (%).
- ^c Calculated using Independent Samples t-test; values expressed as mean ± standard deviation (SD).

Abbreviations: CD, Crohn's disease; mL, millilitre; n, number of subjects; SD, standard deviation; UC, ulcerative colitis.

Impaired rectoanal coordination occurred in 46.0% of patients, while dyssynergic defecation was present in 6.0%. Overall anorectal dysfunction affected 74.0%, with combined or multifactorial abnormalities being the predominant pattern. No significant differences existed between UC and CD (Table 4).

Table 4. Defecatory Coordination, Diagnostic Severity, and Prevalence of Anorectal Dysfunction (n=50)

Anorectal Motility Variable	Overall Cohort (n=50) n (%)	Ulcerative Colitis (n=29) n (%)	Crohn's Disease (n=21) n (%)	p-value ^a
Rectoanal coordination				0.177 ^b
Normal	27 (54.0)	18 (62.1)	9 (42.9)	
Impaired	23 (46.0)	11 (37.9)	12 (57.1)	
Dyssynergic defecation				1.000 ^c
Present	3 (6.0)	2 (6.9)	1 (4.8)	
Absent	47 (94.0)	27 (93.1)	20 (95.2)	
Balloon expulsion test (BET)				—
Normal (≤60 s)	50 (100)	29 (100.0)	21 (100.0)	
Abnormal (>60 s)	0 (0.0)	0 (0.0)	0 (0.0)	
Overall anorectal dysfunction				0.723 ^b
Present	37 (74.0)	22 (75.9)	15 (71.4)	
Absent	13 (26.0)	7 (24.1)	6 (28.6)	
Severity of ARM abnormalities (number of defects)				0.611 ^b
Normal ARM (0 defects)	8 (16.0)	5 (17.2)	3 (14.3)	
Mild (1 defect)	13 (26.0)	6 (20.7)	7 (33.3)	
Moderate (2–3 defects)	20 (40.0)	13 (44.8)	7 (33.3)	
Severe (≥4 defects)	9 (18.0)	5 (17.2)	4 (19.0)	
Final ARM diagnostic pattern				0.548 ^b
Normal ARM study	8 (16.0)	5 (17.2)	3 (14.3)	
Single isolated abnormality	13 (26.0)	6 (20.7)	7 (33.3)	
Combined / multifactorial abnormalities	29 (58.0)	18 (62.1)	11 (52.4)	

- ^a Comparison between Ulcerative Colitis and Crohn's Disease.
- ^b Calculated using Pearson Chi-square test; values expressed as number (n) and column percentage (%).
- ^c Calculated using Fisher's exact test.

Abbreviations: ARM, anorectal manometry; BET, balloon expulsion test; CD, Crohn's disease; n, number of subjects; s, seconds; UC, ulcerative colitis.

Stool urgency was significantly associated with rectal hypersensitivity and impaired rectoanal coordination. Fecal incontinence was significantly associated with reduced squeeze pressure and rectal hypersensitivity, while constipation and incomplete evacuation were associated with dyssynergic defecation and impaired coordination, respectively (Table 5).

Table 5. Associations Between Presenting Symptoms and Specific Anorectal Manometry Abnormalities (n=50)

Clinical Symptom	Evaluated Physiological Parameter	Parameter Present / Abnormal n (%)	Parameter Absent / Normal n (%)	p-value ^a
Stool urgency	Rectal hypersensitivity			<0.001 ^b
Present (n=19)		14 (73.7)	5 (26.3)	
Absent (n=31)		9 (29.0)	22 (71.0)	
Stool urgency	Impaired rectoanal coordination			<0.001 ^b
Present (n=19)		14 (73.7)	5 (26.3)	
Absent (n=31)		9 (29.0)	22 (71.0)	
Fecal incontinence	Reduced squeeze pressure			0.018 ^c
Present (n=5)		5 (100.0)	0 (0.0)	
Absent (n=45)		20 (44.4)	25 (55.6)	
Fecal incontinence	Rectal hypersensitivity			0.008 ^c
Present (n=5)		5 (100.0)	0 (0.0)	
Absent (n=45)		18 (40.0)	27 (60.0)	
Constipation	Dyssynergic defecation			0.001 ^c
Present (n=8)		3 (37.5)	5 (62.5)	
Absent (n=42)		0 (0.0)	42 (100.0)	
Incomplete evacuation	Impaired rectoanal coordination			0.002 ^b
Present (n=15)		12 (80.0)	3 (20.0)	
Absent (n=35)		11 (31.4)	24 (68.6)	

- ^aValues expressed as number (n) and row percentage (%).
- ^bCalculated using Pearson Chi-square test.
- ^cCalculated using Fisher's exact test.

Abbreviations:

ARM, anorectal manometry; n, number of subjects.

Abdominal pain was significantly associated with overall anorectal dysfunction, while rectal hypersensitivity was more frequent among patients with blood in stools. Anorectal dysfunction increased progressively with longer disease duration, reaching 88.9% after six years (Table 6).

Table 6. Associations of Abdominal Pain, Rectal Bleeding, and Disease Chronicity with Anorectal Dysfunction (n=50)

Clinical Parameter	Evaluated Anorectal Abnormality	Abnormality Present n (%)	Abnormality Absent n (%)	p-value ^a
Abdominal pain	Overall anorectal dysfunction			0.028 ^b
Present (n=29)		25 (86.2)	4 (13.8)	
Absent (n=21)		12 (57.1)	9 (42.9)	
Blood in stools	Rectal hypersensitivity			0.041 ^b
Present (n=16)		11 (68.8)	5 (31.2)	
Absent (n=34)		12 (35.3)	22 (64.7)	
Disease duration strata	Overall anorectal dysfunction			0.012 ^b
<1 year (n=9)		4 (44.4)	5 (55.6)	
1–3 years (n=19)		14 (73.7)	5 (26.3)	
4–6 years (n=13)		11 (84.6)	2 (15.4)	
>6 years (n=9)		8 (88.9)	1 (11.1)	

- ^aValues expressed as number (n) and row percentage (%).
- ^bCalculated using Pearson Chi-square test.

Abbreviations:

n, number of subjects.

Longer disease duration correlated positively with the number of abnormal ARM parameters (r=0.412, p=0.003) and negatively with resting anal pressure (r=−0.294, p=0.038). Stool frequency also correlated positively with ARM abnormalities (r=0.368, p=0.009) (Table 7, Figure 1).

Table 7. Spearman Rank Correlation Analyses Between Clinical Indices and Anorectal Manometry Parameters (n=50)

Clinical / Disease Variable (X)	Manometric Parameter (Y)	Sample Size (n)	Correlation Coefficient (r) ^a	p-value
Disease duration (years)	Number of abnormal ARM parameters	50	0.412	0.003
Disease duration (years)	Resting anal pressure (mmHg)	50	−0.294	0.038
Daily stool frequency	Number of abnormal ARM parameters	50	0.368	0.009

^a Calculated using Spearman rank-order correlation analysis (r = Spearman correlation coefficient).

Abbreviations: ARM, anorectal manometry; mmHg, millimetres of mercury; n, number of subjects; r, correlation coefficient.

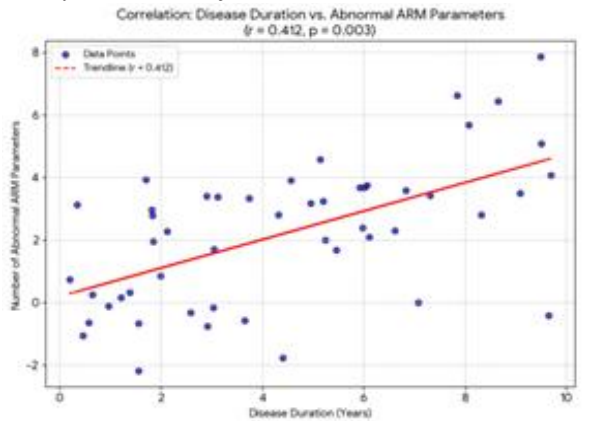


Figure 1: Correlation Between Disease Duration and Number of Abnormal ARM Parameters

DISCUSSION

This study evaluated anorectal neuromuscular physiology in 50 Indian patients with quiescent or mild IBD. Anorectal dysfunction was identified in 74.0% of the cohort, with no significant differences between UC and CD across most objective parameters. This equivalence indicates that physiological pelvic floor dysfunction is a common sequela of chronic bowel illness rather than an entity confined to a single disease subtype.

Symptomatic differences between UC and CD aligned closely with prior literature (Petryszyn & Paradowski, 2018). While urgency and bleeding predominated in UC, constipation and evacuation failure were more common in CD. Petryszyn and Paradowski (2018) similarly underscored that defecatory complaints frequently persist despite mucosal healing and should not be reflexively ascribed to active flaresups.

Sphincter weakness was prominent in our cohort, with 50.0% demonstrating reduced maximum squeeze pressure and 32.0% showing diminished resting tone. These observations parallel those of Costache et al. (2024), who reported reduced resting pressure in 48.0% and squeeze impairment in 55.0% of IBD patients, with an overall manometric abnormality rate of 79.0%. As demonstrated by Papathanasopoulos et al. (2010), accelerated external anal sphincter fatigability is common in IBD and contributes significantly to incontinence.

Sensory abnormalities, particularly rectal hypersensitivity (46.0%), were common and showed a strong association with stool urgency (p < .001). Classical work by Rao et al. (1987) and contemporary reviews by Dubinsky et al. (2023) confirm that rectal wall compliance loss and visceral hypersensitivity are primary determinants of fecal urgency in colitis.

Although 46.0% had impaired rectoanal coordination during strain maneuvers, only 6.0% fulfilled complete manometric criteria for dyssynergic defecation, and all demonstrated normal balloon expulsion times. Albuquerque et al. (2021) observed a similar phenomenon in CD, where 69.0% demonstrated dyssynergic strain curves but only 6.0% had functional outlet obstruction. This highlights that physiological discoordination represents a broad spectrum and must be correlated with clinical symptoms and expulsion tests rather than assessed in isolation.

Importantly, anorectal dysfunction increased with disease duration, reaching 88.9% in patients with disease duration >6 years. Chronicity also correlated with the accumulation of manometric defects ($r = .412$) and lower resting pressure ($r = -.294$). This mirrors the findings of Wu et al. (2024), indicating that recurrent low-grade inflammation leads to progressive neuromusculoskeletal remodeling of the rectal reservoir and anal canal.

CONCLUSION

In conclusion, the present study demonstrates that anorectal dysfunction is common among patients with inflammatory bowel disease, affecting 74% of the study population. Although no significant differences were observed between ulcerative colitis and Crohn's disease in most anorectal manometric parameters, both groups showed frequent abnormalities in sphincter pressure, rectal sensation, and rectoanal coordination. Rectal hypersensitivity and impaired coordination were particularly associated with stool urgency, while reduced squeeze pressure and hypersensitivity were associated with fecal incontinence. Constipation and incomplete evacuation were related to dyssynergic defecation and impaired coordination, respectively. Longer disease duration and increased stool frequency were significantly associated with a greater number of ARM abnormalities. These findings highlight the importance of ARM in identifying underlying anorectal dysfunction in symptomatic IBD patients and may facilitate appropriate targeted management.

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