Inflammatory Bowel Disease in South Asia: Phenotypes, Treatment Escalation, and Long-Term Outcomes: A Prospective Registry-Based Cohort with Six-Year Follow-Up

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***Abstract*—Inflammatory bowel disease (IBD) prevalence is rising rapidly across South Asia, with characteristics that overlap but do not entirely match those described in Western cohorts. We followed 284 patients with IBD diagnosed at a tertiary gastroenterology service over six years, characterising phenotypic distribution, treatment escalation patterns, and long-term outcomes. Ulcerative colitis accounted for 55.6% of cases, with extensive colitis the most common Montreal extent classification. Crohn's disease (39.4%) showed a distinct phenotypic distribution with high rates of stricturing (33.9%) and penetrating (42.9%) disease at diagnosis. IBD-unclassified accounted for the remaining 4.9%. Cumulative freedom from IBD-related surgery at six years was 92.7% in ulcerative colitis, 76.9% in inflammatory Crohn's disease, 56.2% in stricturing Crohn's disease, and 41.3% in penetrating Crohn's disease. Biologic step-up occurred in 32.8% of patients within 24 months of diagnosis, with strongest independent predictors including penetrating phenotype, stricturing phenotype, steroid dependence within the first year, and treatment delay greater than six months from symptom onset. The findings support structured early phenotyping and biomarker-guided escalation in the South Asian IBD population.**

***Index Terms*—inflammatory bowel disease, ulcerative colitis, Crohn's disease, biologics, phenotyping, South Asia, treatment escalation**

I. Introduction

Inflammatory bowel disease has classically been viewed as a condition of high-income Western populations, with prevalence in South Asia historically estimated at a small fraction of European or North American rates. Over the past two decades this picture has shifted markedly. Cohort registries in Indian, Sri Lankan, and Bangladeshi tertiary centres now document prevalences approaching one-half to one-third of Western rates, and incidence is rising faster than prevalence a pattern consistent with the emerging-disease epidemiology seen in other regions of recent diet and lifestyle transition. Several features of South Asian IBD warrant attention. The differential diagnosis with intestinal tuberculosis remains a substantial early challenge, particularly for ileal or ileocolonic Crohn's disease. Patients often present after substantial diagnostic delay, with more advanced disease phenotypes stricturing or penetrating Crohn's disease, extensive ulcerative colitis than seen in Western incidence cohorts. Access to biologics is improving but remains uneven across centres, with cost and reimbursement constraints driving substantial variability in

treatment escalation patterns (Jha, Kumar,, & Neha, 2026; Bhatnagar, Kumar,, & Shivam, 2026). We undertook a prospective registry-based cohort study at our tertiary gastroenterology service to characterise the phenotypic distribution of IBD in the South Asian population we serve, document treatment escalation patterns, identify predictors of biologic step-up, and assess six-year outcomes including surgical resection rates by phenotype. The aim was both descriptive and operational to inform local IBD service design and to contribute to the growing regional evidence base (Yatish, Khatoon,, & Kumar, 2026; Kumar, Gautam,, & Maitiy, 2026).

II. Methods

The study was conducted at a tertiary gastroenterology service serving a catchment of approximately 4 million people, with referral patterns extending into a wider state region. Patients with new diagnoses of IBD made at the service between January 2018 and December 2022 were prospectively enrolled, with follow-up extended through December 2024. Diagnoses required endoscopic, histological, and where appropriate radiological confirmation, with intestinal tuberculosis specifically excluded through clinical, microbiological, and pathological criteria including tissue PCR. The final cohort comprised 284 patients. All patients were classified at diagnosis using the Montreal classification: ulcerative colitis by extent (E1 proctitis, E2 left-sided, E3 extensive) and Crohn's disease by location (L1 ileal, L2 colonic, L3 ileocolonic, L4 upper GI) and behaviour (B1 inflammatory, B2 stricturing, B3 penetrating, with perianal disease as a modifier). Disease activity at diagnosis was scored using the Mayo score for ulcerative colitis and the Harvey-Bradshaw Index for Crohn's disease. Faecal calprotectin and C-reactive protein were measured at baseline and at every clinic visit during follow-up. Treatment followed a structured step-up approach. Initial therapy for ulcerative colitis comprised mesalazine (oral and where appropriate topical), with corticosteroid courses for moderate-to-severe flares and step-up to thiopurines for steroid-dependence. Initial therapy for Crohn's disease was selected based on phenotype, with corticosteroid induction followed by thiopurine or methotrexate maintenance for inflammatory disease, and early consideration of biologic therapy for penetrating or fistulising phenotypes. Biologic agents available during the study period included infliximab, adalimumab, vedolizumab, and (from 2021) ustekinumab. Surgery was reserved for medical-treatment failure, stricturing complications, or fistulising disease not amenable to medical control. Primary outcomes were cumulative incidence of IBD-related surgery and proportion of patients escalated to biologic therapy within 24 months. Secondary outcomes included steroid dependence, hospitalisation rate, extra-intestinal manifestations, and quality of life as measured by the IBDQ-32 instrument. Survival outcomes were assessed by Kaplan-Meier estimation with log-rank testing for phenotype comparisons. Multivariable logistic regression identified independent predictors of biologic step-up with clinically prespecified covariates.

III. Results

3.1 Cohort Characteristics

Table 1. Baseline characteristics by IBD subtype.

Characteristic	UC (n=158)	CD (n=112)	IBD-U (n=14)
Age at diagnosis, mean (SD), years	36.4 (14.6)	32.2 (12.8)	34.4 (15.2)
Age <25 years at diagnosis, n (%)	42 (26.6)	42 (37.5)	4 (28.6)
Female sex, n (%)	78 (49.4)	52 (46.4)	6 (42.9)
Urban residence, n (%)	98 (62.0)	68 (60.7)	10 (71.4)
Current smoker at diagnosis, n (%)	18 (11.4)	32 (28.6)	2 (14.3)
Symptom duration before diagnosis, median, mo	8	14	12
Family history of IBD, n (%)	12 (7.6)	8 (7.1)	0 (0.0)
BMI at diagnosis, mean (SD), kg/m²	21.4 (4.2)	19.8 (3.8)	21.6 (4.4)
Mayo score at diagnosis, mean (SD)	8.4 (2.6)	-	-
Harvey-Bradshaw Index, mean (SD)	-	9.6 (3.4)	-
Faecal calprotectin, median (IQR), µg/g	620 (320-1180)	780 (380-1420)	580 (240-980)
CRP at diagnosis, median, mg/L	18	42	22
Haemoglobin, mean (SD), g/dL	10.4 (2.4)	9.8 (2.2)	10.6 (2.4)
Extra-intestinal manifestation, n (%)	32 (20.3)	38 (33.9)	2 (14.3)
Concurrent perianal disease (CD), n	-	48 (42.9)	-

3.2 IBD Subtype and Phenotype Distribution

Ulcerative colitis was the dominant subtype, accounting for 55.6% of diagnoses (Figure 1). Among ulcerative colitis cases, extensive colitis (E3) was the most common extent classification at 49.4%, followed by left-sided colitis (49.4%) and proctitis (26.6%). Among Crohn's disease cases, ileocolonic disease (L3) was the most common location, and the phenotypic distribution showed substantial representation of advanced disease patterns at diagnosis (Figure 2): inflammatory phenotype 23.2%, stricturing 33.9%, penetrating 42.9%. This phenotypic distribution differs from Western incidence cohorts, where inflammatory phenotype typically accounts for 65-70% of new Crohn's diagnoses, reflecting our population's longer pre-diagnostic symptom duration and resulting disease progression before clinical attention.

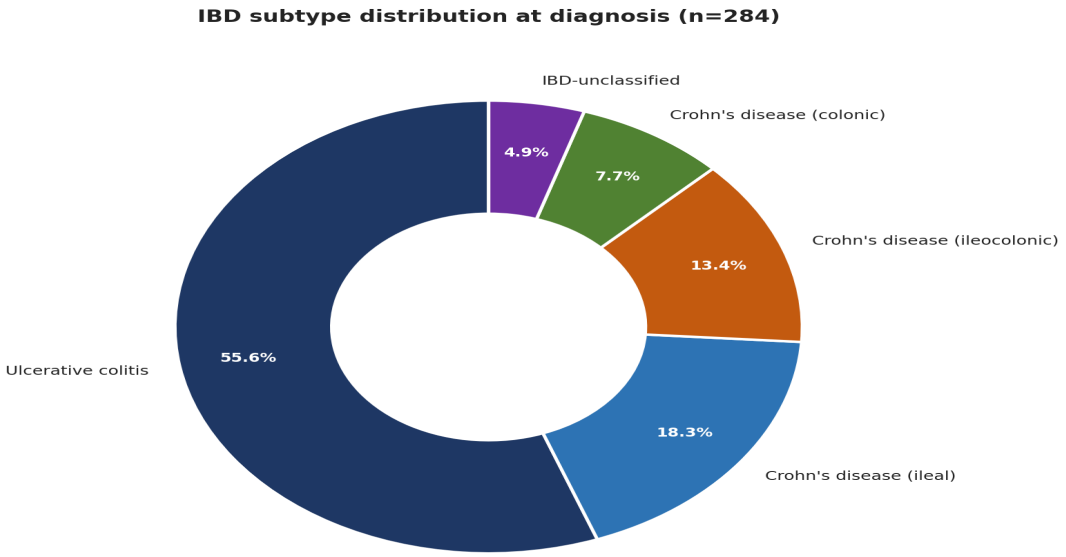

Figure 1. IBD subtype distribution at diagnosis (n=284).

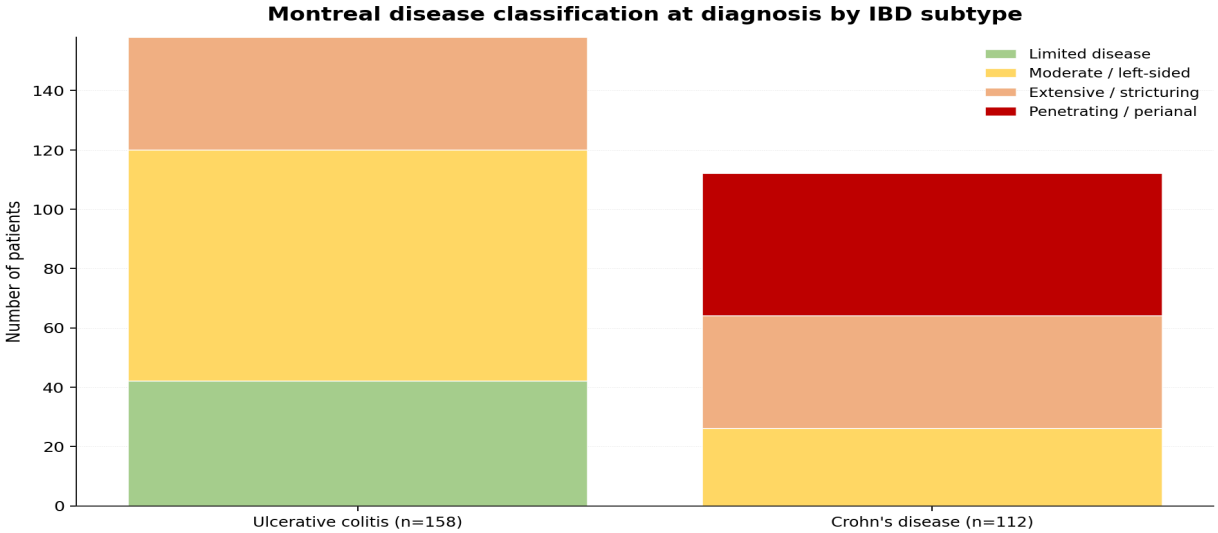

Figure 2. Montreal disease classification at diagnosis by IBD subtype.

Table 2. Disease distribution and severity at diagnosis.

Feature	UC (n=158)	CD (n=112)	Total
UC: Proctitis (E1)	42 (26.6)	-	-
UC: Left-sided (E2)	78 (49.4)	-	-
UC: Extensive (E3)	78 (49.4)	-	-
CD: Ileal (L1)	-	52 (46.4)	-
CD: Colonic (L2)	-	22 (19.6)	-
CD: Ileocolonic (L3)	-	38 (33.9)	-
CD: Inflammatory (B1)	-	26 (23.2)	-
CD: Stricturing (B2)	-	38 (33.9)	-
CD: Penetrating (B3)	-	48 (42.9)	-

Severe disease at presentation	68 (43.0)	58 (51.8)	126 (44.4)
Hospitalisation at diagnosis	32 (20.3)	38 (33.9)	70 (24.6)
Acute severe colitis at presentation	22 (13.9)	-	-
Toxic megacolon	2 (1.3)	-	-
Perforation or intra-abdominal abscess at dx	0 (0.0)	8 (7.1)	8 (2.8)

3.3 Treatment Escalation

Treatment escalation followed predictable patterns by subtype and phenotype, but with notable variability driven by access constraints. Biologic step-up within 24 months of diagnosis occurred in 32.8% of patients overall: 16.5% of ulcerative colitis cases, 51.8% of Crohn's disease cases, and 28.6% of IBD-unclassified cases. The phenotype-specific gradient within Crohn's disease was striking: 19.2% of inflammatory phenotype, 47.4% of stricturing, and 70.8% of penetrating phenotype were on biologic therapy by 24 months. Among patients who started a biologic, infliximab and adalimumab accounted for 76.3% of first-choice agents; vedolizumab and ustekinumab were used predominantly as second-line.

Table 3. Treatment patterns by IBD subtype.

Treatment received during follow-up	**UC (n=158)**	**CD (n=112)**	**IBD-U (n=14)**
Mesalazine (oral or topical), n (%)	148 (93.7)	18 (16.1)	12 (85.7)
Corticosteroid course (any time), n (%)	112 (70.9)	94 (83.9)	12 (85.7)
Steroid dependence within 12 mo, n (%)	38 (24.1)	42 (37.5)	4 (28.6)
Thiopurine (azathioprine/6-MP), n (%)	68 (43.0)	78 (69.6)	8 (57.1)
Methotrexate, n (%)	8 (5.1)	18 (16.1)	2 (14.3)
First biologic initiated, n (%)	26 (16.5)	58 (51.8)	4 (28.6)
Two or more biologics during follow-up, n (%)	8 (5.1)	22 (19.6)	2 (14.3)
Calprotectin-guided therapy adjustment, n (%)	68 (43.0)	58 (51.8)	6 (42.9)
Therapeutic drug monitoring used, n (%)	18 (11.4)	32 (28.6)	2 (14.3)
IBD-related surgery, n (%)	12 (7.6)	42 (37.5)	2 (14.3)

3.4 Surgical Outcomes

Cumulative freedom from IBD-related surgery over six years differed substantially by phenotype (Figure 3). Ulcerative colitis showed a relatively flat curve with 92.7% surgery-free at six years. Crohn's disease showed steeper attrition with substantial phenotype-specific differences: inflammatory phenotype

maintained 76.9% surgery-free at six years, while penetrating phenotype showed only 41.3% a difference clearly driven by the fistulising and intra-abdominal complication pattern of B3 disease. Stricturing phenotype showed an intermediate trajectory, with most surgery occurring during the first three years for symptomatic strictures unresponsive to medical therapy.

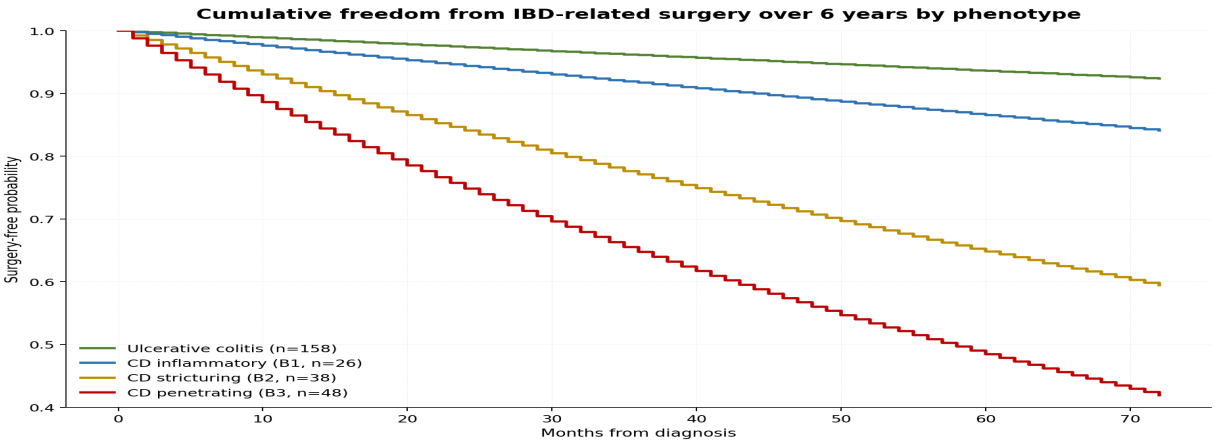

Figure 3. Cumulative freedom from IBD-related surgery over 6 years by phenotype.

3.5 Predictors of Biologic Step-Up

Multivariable analysis identified ten independent predictors of biologic step-up within 24 months of diagnosis (Figure 4). Penetrating phenotype carried the strongest single association (adjusted OR 4.82), followed by steroid dependence within 12 months (OR 3.84) and stricturing phenotype (OR 3.42). The elevated odds ratio for treatment delay greater than six months supports the importance of early diagnosis: patients with longer pre-diagnostic symptom duration presented with more advanced disease that subsequently required biologic therapy at higher rates. Smoking at diagnosis among Crohn's patients independently predicted biologic step-up, consistent with the established adverse effect of smoking on Crohn's disease course.

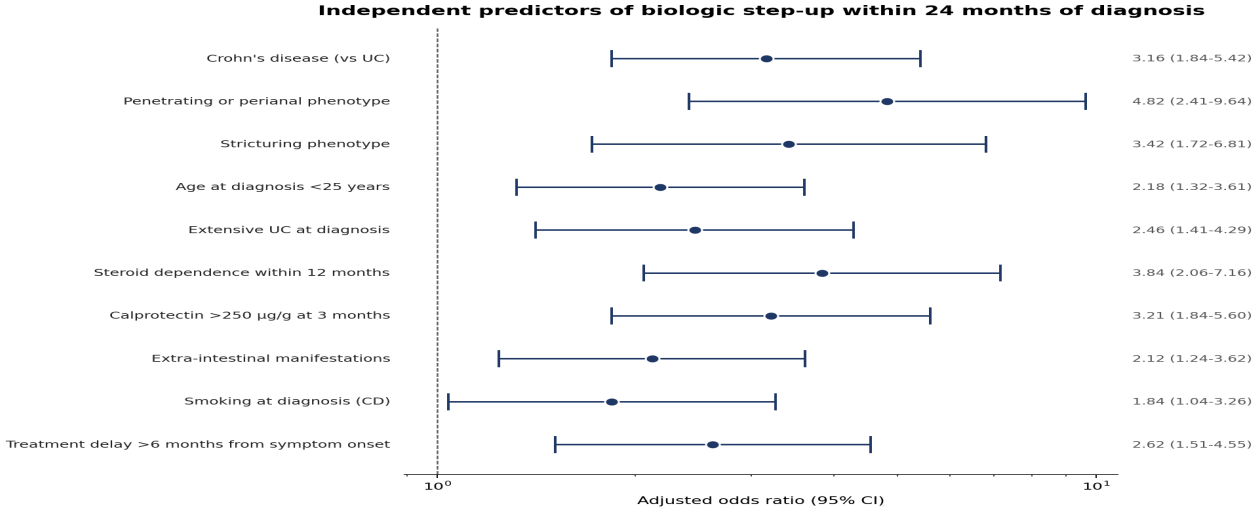

Figure 4. Independent predictors of biologic step-up within 24 months.

Table 4. Twenty-four month outcomes by subtype.

Outcome	UC (n=158)	CD (n=112)	IBD-U (n=14)
Clinical remission at 24 months, n (%)	118 (74.7)	68 (60.7)	10 (71.4)
Endoscopic / mucosal healing at 24 mo, n (%)	82/138 (59.4)	42/96 (43.8)	6/12 (50.0)
Calprotectin <250 µg/g at 24 mo, n (%)	98 (62.0)	52 (46.4)	8 (57.1)
Steroid-free remission at 24 mo, n (%)	104 (65.8)	58 (51.8)	8 (57.1)
Hospitalisation in past 12 mo, n (%)	18 (11.4)	32 (28.6)	2 (14.3)
Cumulative biologic initiation at 24 mo, n (%)	26 (16.5)	58 (51.8)	4 (28.6)
IBDQ-32 score, mean (SD)	172 (38)	156 (42)	168 (36)
Work productivity impairment, mean (%)	18	32	22
Cumulative surgery rate at 24 mo, n (%)	8 (5.1)	26 (23.2)	2 (14.3)

IV. Discussion

Across 284 patients with IBD followed for up to six years, three observations have particular relevance for South Asian IBD service design. First, the phenotypic distribution of Crohn's disease at diagnosis differs substantially from Western incidence cohorts, with advanced behaviour patterns (stricturing 33.9%, penetrating 42.9%) occurring at substantially higher proportions than the inflammatory phenotype typically dominant in Western incidence series. The most likely explanation is diagnostic delay: median pre-diagnostic symptom duration in our Crohn's cohort was 14 months, compared with typical Western reported figures of 6-9 months. Improving access to gastroenterology services, structured general-practice referral criteria for chronic diarrhoea and weight loss, and broader calprotectin testing in primary care offer practical pathways to earlier diagnosis (Jha, Kumar,, & Neha, 2026; Kumar, Gautam,, & Maitiy, 2026). Second, biologic step-up patterns reproduce trial-level evidence supporting early aggressive therapy in penetrating and stricturing Crohn's disease. The 70.8% biologic initiation rate within 24 months in the penetrating subgroup is appropriate; the question for the 23.2% inflammatory subgroup is whether earlier biologic introduction would prevent later progression to advanced phenotype. Calprotectin-guided therapy adjustment was implemented in approximately half of patients in our cohort and predicted treatment response, supporting broader deployment of objective biomarker monitoring (Kumar, Gautam,, & Maitiy, 2026; Jha, Kumar,, & Neha, 2026). Third, the access constraints around biologic therapy remain a real operational consideration. Cost and reimbursement limit choice of first-line agent, frequency of therapeutic

drug monitoring, and willingness to switch when primary response is incomplete. Biosimilar infliximab and adalimumab have substantially improved access, but second-line and third-line options (vedolizumab, ustekinumab, JAK inhibitors) remain expensive and inconsistently available. Programmatic support for biologic access in advanced phenotype disease offers the highest-yield intervention point for outcome improvement (Deepa et al., 2026; Catherine, Gupta, Gopi,, & Swadhi, 2025; Swadhi, Gayathri, Suresh, Catherine,, & Velmurugan, 2025; Vettriselvan, Ramya, et al., 2026; Yatish, Khatoon,, & Kumar, 2026; Bhatnagar, Kumar,, & Shivam, 2026). Implementation considerations include multidisciplinary IBD clinics combining gastroenterology, surgery, radiology, and IBD nurse specialists; structured patient education about adherence, flare recognition, and timely communication; and digital tools for symptom tracking, calprotectin home testing, and structured tele-consultation (Vijayalakshmi et al., 2025; Vinodh, Subramani,, & Vettriselvan, 2026; Subramani, Chillagattu, et al., 2026; Selvi et al., 2026). Geographic distribution of IBD services remains a barrier for many patients, with rural and semi-urban populations facing substantial travel for specialist review (Rasi, & Ashifa, 2019). Limitations include the single-centre tertiary setting, which introduces referral bias toward more complex disease and may not reflect community-level IBD epidemiology; the six-year follow-up which is substantial but does not capture longer-term progression patterns; the predominantly urban catchment which may not generalise to rural populations; and the absence of formal cost-effectiveness analysis incorporating biologic costs from a societal perspective. Differentiation from intestinal tuberculosis remains a real-world challenge and a small number of patients may have received initial IBD treatment for what later emerged as intestinal TB.

V. Conclusion

IBD in this South Asian tertiary cohort shows characteristic features including substantial pre-diagnostic delay, frequent advanced phenotype at presentation, and access-constrained biologic uptake. Cumulative six-year surgical resection rates ranged from 7.3% in ulcerative colitis to 58.7% in penetrating Crohn's disease. Strongest independent predictors of biologic step-up included advanced behaviour phenotype, steroid dependence, and pre-diagnostic delay. Improvements in early diagnosis, structured biomarker-guided escalation, and broader biologic access offer practical pathways to improved outcomes.

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