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RESEARCH ARTICLE

High Diagnostic Yield of Colonoscopy in Symptomatic Adults Aged Under Fifty Years: Missed Opportunities for Early Detection of Colorectal Cancer in Southeast Asia

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ABSTRACT

Aim: Despite the global rise in young-onset colorectal cancer (CRC), data on the diagnostic yield of colonoscopy in symptomatic adults aged <50 years remain scarce. This study evaluates colonoscopic findings and identifies predictors of clinically significant pathology in this cohort.

Method: This retrospective study included symptomatic adults aged 18-49 years who underwent colonoscopy between January 2017 and June 2023 at a Malaysian tertiary referral center. Clinical, endoscopic, histopathological, and complication data were analyzed. Univariate analysis identified predictors of clinically significant pathology, defined as CRC, adenomas (including advanced adenomas), histologically confirmed inflammatory bowel disease (IBD), or diverticulosis, whereas hyperplastic polyps, hemorrhoids, and non-specific colitis were considered non-significant.

Results: Among the 397 patients included (mean age 37±8 years; 51% women), the most common indications were altered bowel habits (n=178), abdominal pain (n=126), and rectal bleeding (n=149). Clinically significant pathology was identified in 15.9% of patients, comprising CRC (3.3%), adenomas (5.8%), IBD (2.8%), and diverticulosis (4.0%). Hyperplastic polyps (8.8%) were excluded from clinically significant pathology and reported separately. Rectal bleeding odds ratio (OR) 2.29, 95% confidence interval (CI) 1.22-4.30; p=0.009, weight loss (OR 4.87, 95% CI 1.49-15.87; p=0.009), and altered bowel habits (OR 1.95, 95% CI 1.07-3.56; p=0.03) were independent predictors. No major procedural complications were observed. The adenoma detection rate was 5.8%, and the colonoscopy completion rate was 81.4%, with incomplete procedures mainly due to looping, obstructing lesions, or poor bowel preparation.

Conclusion: A substantial proportion of symptomatic adults aged <50 years demonstrate clinically significant pathology. These findings support prioritized, symptom-based referral for early colonoscopy rather than universal screening in this age group but require validation in prospective multicenter studies.

Keywords: Colonoscopy, colorectal neoplasms, young colorectal cancer

Introduction

Colorectal cancer (CRC) is among the three most common malignancies worldwide, with nearly two million new cases and over 900,000 deaths annually.[1] Although traditionally considered a disease of older adults, there has been a consistent global increase in young-onset CRC (YOCRC), defined as a diagnosis when aged <50 years.[2] Meta-analyses document rising trends across Europe and North America and increasingly in the Asia-Pacific regions.[3,4]

YOCRC frequently presents with red-flag symptoms, such as rectal bleeding, altered bowel habits, abdominal pain, iron-deficiency anemia, and unintentional weight loss.[7,8] Younger patients often have a low suspicion of cancer, which may contribute to delays in seeking medical attention.[5] Diagnostic delays ranging from 7 weeks to >2 years have been reported, often due to misattribution of symptoms to benign conditions, such as hemorrhoids or irritable bowel syndrome.[7,9] These delays may result in advanced-stage diagnosis, poorer survival outcomes, and more complex surgical management.[2,8]

Despite the rising incidence, data on colonoscopic yield among symptomatic young adults in Southeast Asia remain limited. Identifying predictors of clinically significant pathology is essential to refine triage and referral strategies. This study

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retrospectively examines symptomatic adults aged 18-49 years undergoing colonoscopy at a Malaysian tertiary center, analyzing clinical presentations, colonoscopic and histopathological findings, and associated predictors.

Materials and Methods

A retrospective observational study at a tertiary referral center in Malaysia, which served a mixed urban and semi-rural population, was conducted. Adults aged 18-49 years undergoing colonoscopy for symptomatic indications between January 2017 and June 2023 were included. Exclusion criteria were screening colonoscopy, post-polypectomy surveillance, and inflammatory bowel disease (IBD) follow-up.

Ethics approval was obtained from the International Islamic University Malaysia (IIUM) Research Ethics Committee with reference number: IIUM/504/14/11/2/ IREC 2023-119, date: 21.08.2023.

Data, including demographics, presenting symptoms, colonoscopic findings, interventions, and complications, were extracted from electronic medical records and endoscopy reports. Clinically significant pathology was defined as CRC, adenomas (including advanced adenomas), histologically confirmed IBD, and diverticulosis. Hyperplastic polyps, hemorrhoids, and non-specific colitis were classified as non-significant findings and excluded from the primary outcome analysis. Red flag symptoms included rectal bleeding, weight loss, persistent altered bowel habits (>6 weeks), and anemia.

Statistical Analysis

Continuous variables were summarized as mean ± standard deviation, and categorical variables were presented as frequencies/percentages. Univariate analysis was performed using the chi-square test or Fisher's exact test, as appropriate. Multivariable analysis was not performed due to the limited number of events and the retrospective nature of the study. Odds ratios (ORs) with 95% confidence intervals (CIs) were reported; significance was set at $p<0.05$. Analyses were performed using SPSS version 29.

Results

A total of 397 symptomatic patients met the inclusion criteria. The mean age was 37 years; 57% were aged <40 years, and 51% were women. Most patients were Malay (97%), broadly reflecting the local demographic composition,[10] with a low comorbidity burden (Charlson index 0-2 in 98%). A family history of CRC was present in 3% of patients.

Among the 397 patients, a total of 482 presenting symptoms were recorded. The most common symptoms were altered bowel habits (n=178), rectal bleeding (n=149), abdominal pain (n=126), anemia (n=16), and weight loss (n=13). Eighteen percent of patients reported more than one red-flag symptom; therefore, symptoms were analyzed individually.

Colonoscopy completion (cecal intubation) was achieved in 81.4%, and the adenoma detection rate was 5.8% (Table 1). Among the 74 incomplete colonoscopies, the most common causes were bowel tortuosity and looping (35%), obstructing lesions (22%), severe pain (22%), and poor bowel preparation (17%).

Following an incomplete colonoscopy, 15 patients (20%) required a repeat procedure, and another 10 (14%) underwent computed tomography imaging. Two extracolonic malignancies were detected on CT, and the remainder were benign or normal findings. Among patients with obstructing lesions, most had colorectal adenocarcinoma. One was treated palliatively, and the rest underwent either surgery or neoadjuvant chemotherapy followed by surgery. The

Table 1. Demographic and clinical characteristics for symptomatic patients who underwent diagnostic colonoscopy (n=397)

Variables	n (%)
Age (years)	
Mean	37 (±8)
<40	226 (57)
>40	171 (43)
Ethnicity	
Malay	385 (97)
Gender	
Female	202 (51)
Charlson Comorbidity Index	
Mild (0-2)	388 (98)
Moderate (3-4)	7 (2)
Severe (5-6)	2 (0.5)
Family history of colorectal cancer	10 (3)
Indication	
Altered bowel habit	178
Per rectal bleeding	149
Abdominal pain	126
Anaemia	16
Unexplained loss weight	13
Incomplete colonoscopy	74 (19)
Diagnostic yield positive	113 (28)
Finding	
Colorectal cancer	13 (3.3)
Advanced adenoma	3 (0.8)
Tubular adenoma-low grade dysplasia	20 (5)
Hyperplastic polyp	34 (8.8)
Inflammatory bowel disease	11 (2.8)
Colitis	24 (6)
Solitary rectal ulcer	7 (1.8)
Diverticulum	16 (4)
Neuroendocrine tumour of rectum	2 (0.5)
Haemorrhoid	87 (22)

remaining 36 (48%) patients either declined further work-up or defaulted on follow-up (Table 2).

Clinically significant findings were detected in 15.9% of cases, with CRC (13 cases, 3.3%), adenomas (23 cases, 5.8%), IBD (11 cases, 2.8%), and diverticulosis (4%). Rectal bleeding (OR 2.29; 95% CI 1.22-4.30; p=0.009), weight loss (OR 4.87; 95% CI 1.49-15.87; p=0.009), and altered bowel habits (OR 1.95; 95% CI 1.07-3.56; p=0.03) were independent predictors of significant findings. No major complications were recorded (Table 3).

The 13 patients (3.3%) diagnosed with CRC were analyzed; 10 (77%) were aged 45-49 years, and the majority were women (n=9). Most tumors were located in the left colon and rectum. Importantly, 9 of the 13 patients (69%) were diagnosed at Stage III or IV, and 6 patients (46%) had distant metastases at diagnosis, most commonly to the liver, peritoneum, or ovary (Table 4).

Table 2. Sequelae of incomplete colonoscopy in young symptomatic patients (n=74)

Additional procedure	n (%)	Outcome
Re-colonoscopy	15 (20)	10 Normal findings 3 Diverticulum 1 Benign polyp 1 Colitis
CT abdomen/colonography	10 (14)	3 Normal findings 2 Malignancy -extracolonic 2 Diverticulum 1 Benign polyp 1 Tuberculosis gut 1 Symptomatic gall stone
Surgery/chemotherapy/ palliation	13 (18)	-
Defaulted/refusal investigation	36 (48)	-

CT: Computer tomography

Discussion

This study demonstrates a substantial diagnostic yield of colonoscopy in symptomatic adults aged <50 years, with 15.9% exhibiting clinically significant pathology (CRC, adenomas, IBD, diverticulosis). Given the small number of CRC cases, the model evaluates predictors of overall clinically significant pathology rather than CRC-specific outcomes. CRC was detected in 3.3%, or >28% of the clinically significant findings. Although a high proportion presented at advanced stages consistent with late YOCRC patterns globally, causal inference regarding diagnostic delay cannot be established due to the absence of time-to-diagnosis data.[2,8]

Predictor analysis showed that rectal bleeding and weight loss were significantly associated with pathology findings, supported by prior reports showing hematochezia in 46%, weight loss in 10%, and anemia in 13% of cases.[7,8,11,12] These symptoms remain critical red flags, particularly given that most affected patients lack family history or known genetic syndromes.[7,11]

Importantly, this cohort represents a symptomatic tertiary referral population rather than a screening cohort, which likely reflects the lower colonoscopy completion rate compared with international benchmarks. The colonoscopy completion rate (81.4%) was below recommended standards. This may reflect real-world procedural challenges, including poor bowel preparation, obstructing lesions, and patient-related factors. Recent machine-learning models using real-world data have also highlighted the potential value of clinical variables for early-onset CRC risk prediction.[13]

Incomplete colonoscopy and high default rates (48%) represent a substantial source of potential bias and may lead to underestimation of proximal pathology. Multivariate analysis has demonstrated globally similar findings where poor bowel preparation, obstructing lesions, and pain significantly affect colonoscopy completion.[14]

Table 3. Logistic regression analysis between symptoms and positive diagnostic yield from colonoscopy in young symptomatic patients

	Histological findings			Univariate analysis	
Symptoms	Colorectal cancer n (%)	Advanced adenoma n (%)	Tubular adenoma low grade dysplasia n (%)	Odds ratio (95% CI)	p-value
Altered habit (n=178)	6 (3)	1 (0.5)	8 (4)	1.95 (1.07-3.56)	0.03
Per-rectal bleeding (n=149)	3 (2)	2 (1)	10 (7)	2.29 (1.23-4.28)	0.009
Anaemia (n=16)	2 (13)	0	0	1.67 (0.47-5.92)	0.43
Weight loss (n=13)	2 (15)	0	1 (7)	4.87 (1.47-16.05)	0.009
Abdominal pain (n=126)	6 (5)	0	5 (4)	1.55 (0.85-2.82)	0.16

CI: Confidence interval

Table 4. Demographic young symptomatic patient with CRC

Age	Gender	Location	Staging	Metastasis Location
30	Female	Sigmoid	Stage 3	
36	Female	Rectum	Stage 4	Spleen
39	Male	Rectosigmoid	Stage 3	
46	Female	Rectum	Stage 4	Ovary
46	Female	Sigmoid	Stage 4	Peritoneal
47	Female	Descending	Stage 3	
47	Male	Rectosigmoid	Stage 3	
48	Female	Splenic Flexure	Stage 3	
49	Female	Sigmoid	Stage 4	Liver, lung and bone
49	Female	Rectosigmoid	Stage 2	
38	Male	Caecum	Stage 4	Liver and lung
45	Male	Rectum	Stage 3	
46	Male	Rectosigmoid	Stage 1	

CRC: Colorectal cancer

The regression model was intentionally parsimonious to avoid overfitting, given the retrospective design and limited number of CRC events. The results are consistent with previous meta-analyses demonstrating a higher diagnostic yield among symptomatic patients.[6]

The predominantly Malay cohort reflects local demographics; however, this may limit generalizability to more diverse populations. Malays form approximately 80% of the city population, and the center is a semi-government hospital providing subsidized care for government officials, who are mostly Malays.[10]

Study Limitations

Limitations include the retrospective design and single-center setting, which may affect generalizability, though the sizeable cohort and histopathological confirmation strengthen the results. Prospective, multicenter studies across Southeast Asia are needed to validate these findings, assess screening or triage models, and explore integration of emerging risk stratification tools, such as machine learning models using symptoms and basic laboratories.[3,9,13]

Conclusion

Colonoscopy in symptomatic adults aged <50 years demonstrates a meaningful diagnostic yield. Rectal bleeding and weight loss strongly predict positive findings and should prompt early referral. These findings support symptom-based referral strategies but should not be extrapolated to population-level screening without further prospective multicenter validation.

Ethics

Ethics Committee Approval: Ethics approval was obtained from the International Islamic University Malaysia (IIUM) Research Ethics Committee with reference number: IIUM/504/14/11/2/ IREC 2023-119, date: 21.08.2023.

Informed Consent: This is retrospective study and data was retrieved using electronic medical record with no intervention from the study, thus no consent was taken from patient.

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Footnotes

Authorship Contributions

Surgical and Medical Practices: M.I.M.S., F.N.Z.A., A.M.N., F.E., Concept: F.N.Z.A., A.M.N., F.E., Design: F.N.Z.A., A.M.N., F.E., Data Collection or Processing: F.N.Z.A., A.M.N., F.E., Analysis or Interpretation: M.I.M.S., F.N.Z.A., F.E., Literature Search: M.I.M.S., F.N.Z.A., F.E., Writing: M.I.M.S., F.N.Z.A., A.M.N., F.E.

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