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Demographic and Clinical Profile of Patients Undergoing Colonoscopy in the Teaching Hospital for Gastroenterology and Hepatology in Sulaymaniyah City, Kurdistan/Iraq

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ABSTRACT

Colonoscopy serves as the primary diagnostic modality, screening, and therapeutic instrument for a wide range of pathologies of the rectum, colon, and terminal ileum. The aim of this study is to evaluate the demographic, clinical, and histological parameters of the records of patients who underwent colonoscopy at the Teaching Hospital for Gastroenterology and Hepatology in Sulaymaniyah City. This is a retrospective cross-sectional study that included the hospital records of all the patients who had undergone colonoscopy from 2022 to 2024 in the Teaching Hospital for Gastroenterology and Hepatology in Sulaymaniyah City. The study involved 933 patients, with a mean age of 46.6 years. The diagnostic yield of colonoscopy was 62.43%, with colorectal polyps being seen 17.04% of the time and ulcer lesions being inconclusive 5.03% of the time. Internal hemorrhoids were 11.78%. The odds ratio for colorectal adenocarcinoma (CRC) was 9.86 for ages >50 years and 0.14 for females. Age ≥50 years was associated with a higher chance of adenocarcinoma compared to those <50 years, but the confidence interval is wide owing to limited adenocarcinoma incidence (n = 27). The study shows colonoscopy is most used for gastrointestinal bleeding, bowel habits, and chronic abdominal pain, with underutilization in developed countries and lower patient age in Kurdish-inhabited area.

Index Terms: Colonoscopy, Colorectal Cancer, Colorectal Polyps, Retrospective Study, Diagnostic Yield

1. INTRODUCTION

Lower gastrointestinal symptoms are commonly encountered in patients attending internal medicine and gastroenterology outpatient clinics. While some of these symptoms can be diagnosed clinically, others require endoscopic evaluation, particularly colonoscopy [1]. Colonoscopy is a widely used method for diagnosing and treating gastrointestinal diseases, remaining the "gold standard" for most large intestine diseases. With increasing cases, demand and availability of colonoscopy examinations are increasing. New methods for cleansing the intestine and administration patterns are emerging [2]. Colonoscopy is a crucial procedure for diagnosing, screening for, and treating gastrointestinal abnormalities in the rectum, colon, and terminal ileum. As the gold standard for evaluating lower gastrointestinal symptoms, it enables detection of colonic polyps, ulcers, bleeding, inflammation, and tumors. It is also considered the best modality for colon cancer screening and surveillance [3,10]. Colonoscopy is an endoscopic procedure that evaluates the entire colon and performs therapeutic procedures using a flexible tube and fiber-optic camera. It passes through the anus of patients after proper preparation. The

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procedure detects gastrointestinal abnormalities such as polyps, malignant masses, ulcerations, and bleeds. A biopsy confirms diagnosis, potentially diagnosing diseases such as inflammatory bowel diseases (IBD) and polyps. It also aids in therapeutics such as polypectomy, electrocautery, and radiofrequency ablation therapy for oncological patients. Regular colonoscopies are conducted in our institution for various indications such as abdominal pain, bleeding, melena, bowel habits changes, chronic diarrhea, anemia, weight loss, and malignancy suspicion [1]. Colonoscopy plays a crucial role in clinical practice, but there are limited studies on patients in Sulaymaniyah City, Kurdistan/Iraq. For clarity, we define key terms: colorectal cancer (CRC) refers to malignant neoplasms of the colon or rectum regardless of histology; adenocarcinoma specifically denotes the gland-forming epithelial malignancy constituting 90–95% of CRCs [3]. These terms will be used consistently throughout. This study aims to assess demographic characteristics, clinical presentations, colonoscopy observations, and histological findings of patients undergoing colonoscopy in Sulaymaniyah City for Kurdistan/Iraq, based on records from the Teaching Hospital for Gastroenterology and Hepatology [22].

2. MATERIALS AND METHODS

2.1. Study Design and Setting

This retrospective cross-sectional study included hospital records of all patients who underwent colonoscopy between January 1, 2022, and December 31, 2024, at the Gastroenterology Unit of the Teaching Hospital for Gastroenterology and Hepatology in Sulaymaniyah City. The study was approved by the Scientific and Ethics Committees of the College of Nursing, University of Sulaimani, Sulaimaniyah, Iraq. Final administrative approval for data collection was also obtained from the Sulaimani General Directorate of Health and the Sulaimani General Teaching Hospital.

2.2. Procedure of Colonoscopy

All patients adhered to a liquid diet on the day preceding colonoscopy. Each received oral administration of a 10 mg bisacodyl pill approximately 6–8 h before initiating overnight fasting. On the procedure day, patients consumed 2 L of bowel preparation solution consisting of 118 g polyethylene glycol 4000, 2.93 g sodium chloride, 1.48 g potassium chloride, 3.37 g sodium bicarbonate, and 11.36 g anhydrous sodium sulfate dissolved in 2 L of water. Patients were provided detailed instructions and guidance from trained nurses to ensure compliance with bowel preparation. Effective preparation was confirmed when patients experienced 8–10 episodes of loose stools.

Inadequate bowel preparation was noted when the patient failed to adhere to the specified instructions for bowel preparation or when the mucosa was not sufficiently visualized during colonoscopy. All colonoscopies were conducted utilizing Olympus CFQ145L, CF-Q165I, or CF-Q165L video colonoscopes. Tissue samples from visible lesions, when required, were collected and sent for histopathological analysis.

2.3. Study Participants and Selection Criteria

The study, conducted at a teaching hospital specializing in gastroenterology and hepatology, aimed to refine patient records for the analysis of colonoscopy procedures. From an initial 1020 patient records, 28 were excluded due to incomplete data, and 59 (5.7%) records were excluded because the patients had inadequate bowel preparation at the time of the colonoscopy. After exclusions for incomplete records and inadequate bowel preparation Figure 1, the final cohort comprised 933 patients.

2.4. Data Collection

The researcher reviewed patient entries in the physical colonoscopy register, retrieved relevant data, and entered it into a spreadsheet using IBM statistical package for social sciences (SPSS) (IBM SPSS Statistics for Windows, Version 27.0, IBM Corp). Indications labeled as "Other" in Table 1 encompassed chronic constipation, Crohn's disease, foreign bodies, rectovaginal fistulas, thickened bowel walls, and rare/unspecified indications (e.g., ischemic colitis). The study maintained participant confidentiality and anonymity, ensuring no personal or identifiable data were collected from the dedicated staff who maintained the register without further involvement.

2.5. Study Variables

The variables studied in this study included gender, age group, indications for colonoscopy: The reasons or symptoms prompting the colonoscopy procedure, observations made during the procedure, such as the presence of

TABLE 1: Indications for colonoscopy in the study participants (*n*=933)

Indication	Count	Percentage
Altered bowel habit	209	22.40
Rectal mass	88	9.43
Cancer screening or surveillance	73	7.82
Anemia	90	9.64
Lower gastrointestinal bleeding	246	26.36
Persistent or recurrent abdominal pain	207	22.18
Other*	20	2.14

Other* includes chronic constipation (*n*=6), Crohn's disease (*n*=7), foreign bodies (*n*=3), rectovaginal fistulas (*n*=2), thickened bowel walls (*n*=1), and unspecified indications (*n*=1).

polyps, abnormalities, or other significant findings, and histopathological findings.

2.6. Study Size

We considered the presence of adenocarcinomas the primary outcome. A standard formula for cross-sectional studies [4] was used: sample size $n = Z^2_{a/2} * P * (1–P)/d^2$, where $Z_{a/2}$ was set to 1.96 for a 95% level of confidence, P is the estimated proportion of prevalence of the main outcome, and d is the level of precision that was wanted, which was set to 0.02. We implemented a convenience sampling method to select participants. However, the study included all patients who met the study criteria, resulting in a final sample size of 933. Pregnant women were not part of the study population; no cases of pregnancy were recorded in the dataset.

2.7. Statistical Analysis

The study used continuous variables (mean, 95% confidence interval [CI], standard deviation [SD], range) and categorical variables (frequency and percentages). We used Pearson's two-test to evaluate the association between categorical variables, considering a $P < 0.05$ as statistically significant. The strength of associations was assessed using the odds ratio (OR). All statistical analyses were performed using the SPSS (SPSS Statistics for Windows, Version 27.0, IBM Corp).

3. RESULTS

3.1. Indications for Colonoscopy

This study included 933 patients. The mean age of the patients was 46.6 years (95% CI: 45.5, 47.7). The SD was 16.4 years, with ages ranging across the available dataset. Among the study participants, 458 (49.1%) were male, and 475 (50.9%) were female, yielding a male-to-female ratio of 0.96:1. Figure 2 shows the gender distribution of the study participants.

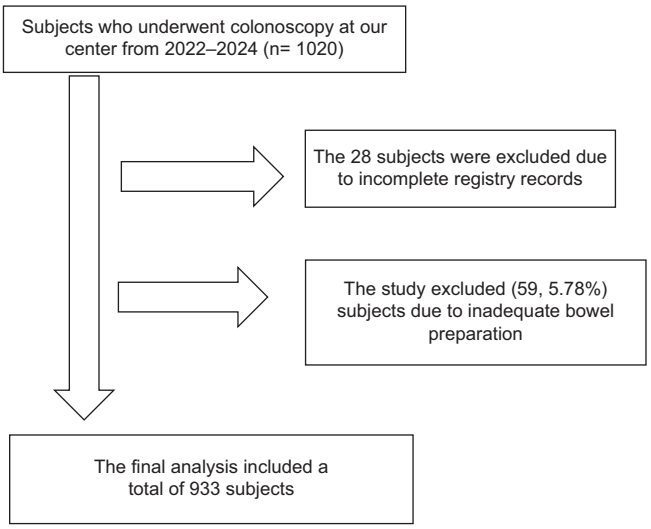

Fig. 1. The flowchart displays the participant's inclusion and exclusion from the cross-sectional study.

3.2. Indications for Colonoscopy

Common indications for colonoscopy included lower gastrointestinal bleeding (n = 246, 26.36%) and persistent or recurrent abdominal pain (n = 207, 22.18%). In addition, a change in bowel habits was also a common indication (n = 209, 22.40%). Other indications included cancer screening or surveillance (n = 73, 7.82%), anemia (n = 90, 9.64%), and rectal mass (n = 88, 9.43%). The study also found that some patients had abnormalities on abdominal imaging, such as bowel walls that were thicker (n = 1), foreign bodies (n = 3), rectovaginal fistulas (n = 2), chronic constipation (n = 6), and Crohn's disease (n = 7). Table 1 illustrates the reported indications.

3.3. Findings of Colonoscopy

Colonoscopy showed no abnormalities in 350 cases (37.51%). Therefore, the overall diagnostic yield of colonoscopy was 62.43%. Table 2 shows the diagnostic yield values according to the various indications for colonoscopy. The research determined the polyp detection rate (PDR) to be 17.04%, 110 cases of internal hemorrhoids (11.88%), 98 cases of colitis (10.5%), 47 cases of ulcer lesions (5.03%), 29 cases of IBD (3.1%), 28 cases of mass lesions (3%), 26 cases of proctitis (2.78%), and 47 cases of ulcer lesions (5.03%). Other findings were n = 86, 9.2%. Fig. 3 illustrates the reported findings.

3.4. Histopathological Findings

In the current study, 39.33% (n = 367) of the study subjects' cases were examined histopathologically. Of these 367 cases,

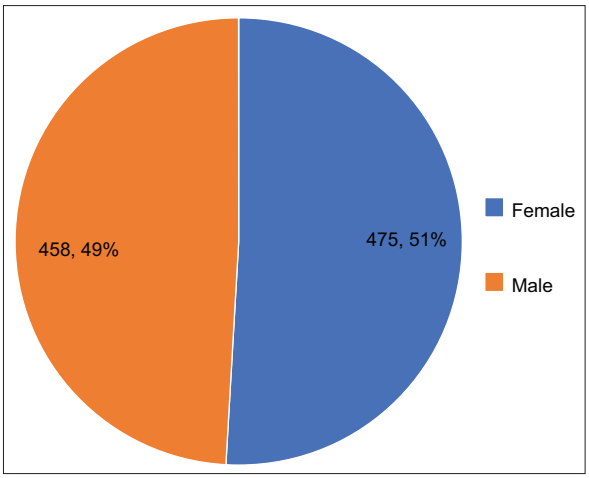

Fig. 2. Gender distribution of the study participants (n = 933).

78 did not reveal any histopathological abnormalities. Table 3 shows that adenocarcinoma (n = 27), neoplastic lesions (n = 20), hamartomatous polyps (n = 13), colonic lipomas (n = 12), colitis "Juvenile polyp is same" (n = 9), and ileitis (n = 6) were some of the most common abnormal findings. In 22 cases, histopathology records were unavailable for the histopathological examination.

TABLE 2: Diagnostic yield of colonoscopy for various indications

Indication	Significant finding present	Total no. cases	Diagnostic yield (%)
Altered bowel habits	98	209	46.88
Cancer screening or surveillance	48	73	65.75
Anemia	64	90	71.11
Lower gastrointestinal bleeding	169	246	68.99
Persistent or recurrent abdominal pain	123	207	59.42
Rectal mass	68	88	77.27

TABLE 3: Histopathological findings in patients who underwent biopsy (n=367)

Histopathological finding	Frequency (n)	Percentage
Hyperplastic polyp	82	22.34
No abnormality detected	78	21.25
Ulcerative colitis	41	10.89
Adenocarcinoma	27	7.35
Neoplastic lesions	20	5.44
Hamartomatous polyp	13	3.54
Colonic lipoma	12	3.26
Colitis	11	2.99
Inflammatory lesions	9	2.45
Juvenile polyp	9	2.45
Ileitis	6	1.63
Records not retrievable	22	5.99
Total	367	100

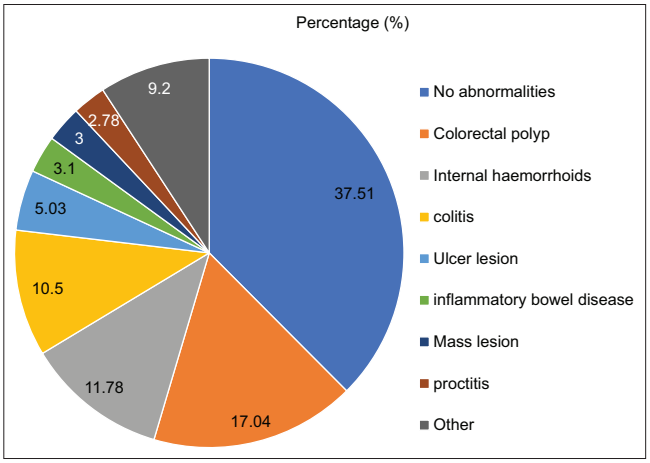

Fig. 3. The study participants (n = 933) underwent colonoscopy to analyze their findings.

3.5. Association between Demographic Parameters and the Presence of Colorectal Adenocarcinoma

Age ≥50 years is associated with a higher likelihood of adenocarcinoma compared to <50 years, but with a very wide CI due to the small number of cases.

The OR is lower in females compared to males for adenocarcinoma, though the wide CI implies statistical uncertainty.

1. Age (≥50 vs. <50)
   - OR: 9.86
   - 95% CI: (0.51, 191.47).
2. Sex (female vs. male)
   - OR: 0.14
   - 95% CI: (0.007, 2.66).

Correlation of demographic factors with the incidence of colorectal adenocarcinoma Pearson's χ^2 test of independence was performed, and it was seen that in patients who underwent colonoscopy, age 50 years and above was associated with the presence of colorectal adenocarcinoma (P = 0.017) with an OR of 9.86 (95% CI: 0.51, 191.47). Furthermore, female gender was not significantly associated with the presence of colorectal adenocarcinoma (P = 0.012, χ^2 test) with an OR of 0.14 (95% CI: 0.007, 2.66). The broad CI is due to statistical imprecision owing to the small number of cases. Results of Pearson's χ^2. test of independence are shown in Table 3.

The wide CIs for both age (95% CI: 0.51–191.47) and sex (95% CI: 0.007–2.66) reflect limited statistical power due to the small number of adenocarcinoma cases (n = 27). While the point estimates suggest strong associations (OR = 9.86 for age ≥50; OR = 0.14 for females), the imprecision cautions against definitive clinical interpretations. This limitation is contextualized further in the discussion.

4. DISCUSSIONS

The average age of the colonoscopy patients in this research was 46.6 years in Sulaymaniyah, Kurdistan/Iraq. This is comparable to the other similar studies done in Baghdad, which was 46.5 [5]. In contrast, a study from Southern Iraq reported an average age of 42.3 years [6]. However, the median age of colonoscopy patients was reported to be a

Table 4: Association between demographic parameters and presence of colorectal adenocarcinoma

Variables	Adenocarcinoma present, *n* (%)	Adenocarcinoma absent, *n* (%)	Total (*n*)	χ^2 statistic	Degrees of freedom	*P*-value
Age group						
≥50 years	3 (0.8)	386 (99.2)	389	5.67	1	0.017
<50 years	0 (0.0)	544 (100.0)	544			
Gender						
Female	0 (0.0)	475 (100.0)	475	6.31	1	0.012
Male	3 (0.7)	455 (99.3)	458			

mean age of 42.84 years in a study done in Erbil, Iraq [7]. In Kurdistan, widespread use of colonoscopy as a screening method for colorectal carcinoma in older individuals is yet to be practiced. This can partly explain why patients undergoing colonoscopy in Kurdistan/Iraq younger are compared to developed countries. Most of the patients who had undergone colonoscopy were women. The male-to-female ratio found was 0.96:1. It has been determined through research that lower socioeconomic status and lower education status among people can be the cause of the lower accessibility to healthcare among men and women during their stay in Kurdistan.

The 16-year age disparity between our cohort (46.6 years) and Western populations (e.g., 62.5 years in USA [8], [9], primarily reflects differential screening utilization. Where >60% of colonoscopies represent screening in developed nations [23], only 7.82% did in our study-consistent with Iraq's lack of organized CRC screening programs. Younger patients thus present predominantly with symptoms rather than prevention intent. Contextual barriers include: (1) absence of national screening guidelines; (2) limited public awareness; (3) resource constraints prioritizing symptomatic care; and (4) cultural reluctance toward preventive procedures-factors similarly observed in resource-limited settings [3], [19]. According to Fatakhova and Rajapakse (2024), the evolution of colon cancer screening and surveillance has necessitated a personal approach to identifying individual risks, optimal surveillance intervals, and the best options for dysplasia management and CRC [12]. The American College of Gastroenterology (ACG) strongly recommends the use of colonoscopy as a screening tool for CRC for individuals between 50 and 75 years [13]. In Iraq, however, according to Dhahi and Almansori, in 2024, the success rate of colonoscopy was relatively lower than the accepted rate because of patient-related factors. It was, however, higher than what was reported in previous studies. Due to the small sample size and the fact that the center was recently opened, we also found a low adenoma detection rate (ADR). The American Society for Gastrointestinal Endoscopy/ACG the Task Force on Quality in Endoscopy recommended that <15% of total colonoscopies performed should have poor bowel preparation [14].

Within this cohort, 5.78% of patients with colonoscopy had inadequate bowel preparation, a higher percentage than in Nepal. This discrepancy likely reflects contextual challenges in our setting, including patient-related factors (e.g., language barriers, low health literacy, and socioeconomic constraints affecting compliance), procedural hurdles (e.g., the complexity of ingesting 2 L of polyethylene glycol solution), and systemic limitations (e.g., lack of dedicated pre-procedure counseling teams and high staff workload). To address these issues, we recommend that trained staff provide simple, easy-to-understand instructions in the local language, frequent reminders, and pamphlets to reduce the percentage of patients with poor bowel preparation [3]. Future quality improvement initiatives could also incorporate phone call reminders and free preparation kits to mitigate socioeconomic barriers, as suggested in similar resource-limited settings [14].

The overall diagnostic yield in our study was 62.43%, with the highest yield in suspected cases of rectal mass (77.72%) followed by anemia (71.11%). The chance of finding a lesion on colonoscopy is maximum in patients with a rectal mass felt on rectal examination or proctoscopy. When we performed a colonoscopy in patients who presented with an altered bowel habit, the diagnostic yield was (46.88%). At our center, in all patients presenting with an altered bowel habit who are suspected of having irritable bowel syndrome (IBS), we perform a colonoscopy to rule out IBD. The ACG recommends testing for fecal calprotectin to rule out IBD in suspected IBS cases [15]. However, since any fecal calprotectin test was not available at our center, we use colonoscopy for the same. This could have been the cause for the low diagnostic yield in patients with an altered bowel habit.

ADR is defined as the percentage of patients who had one or more adenomas detected by colonoscopy [11, 14]. ADR has been widely applied as a measure of quality in colonoscopies.

The American Society for Gastrointestinal Endoscopy/ACG Task Force recommends ADR targets of over 25%, with a high correlation between PDR and ADR reported in several studies [14]. In our center, analysis revealed the PDR to be 17.04%. While CRC was historically less frequent in Asians than in Western populations [16]. Recent studies show Asian incidence rates are escalating and nearing Western levels. This convergence is primarily driven by lifestyle and dietary changes in Asian populations, including increased consumption of processed foods, reduced physical activity, and rising obesity rates associated with rapid urbanization [16]. The Iraq Cancer Registry showed that the incidence of colorectal carcinoma was 6.49% of total body malignancy (Directorate, 2019). Incidence significantly increased throughout the period 2000–2019 in all the age groups but more significantly among adults between 40 and 49 years. The least increase was seen in the age group of 20–29 years in 2019 [17]. Colon cancer incidence is increasing in Iraq, unlike in Western countries where it is decreasing due to proper colonoscopies. There are no studies done in this area, and screening and surveillance guidelines are not followed in the Nepalese healthcare system [18]. The 2024 Taiwan study reveals significant differences in ADR among age groups, suggesting that lowering the screening age may decrease overall ADR. However, the current standard of 25% ADR for screening colonoscopy may still be used. Our results suggest that even if CRC screening starts at age 40 or 45 years, stratified analysis by age/gender remains feasible, showing how common adenomas are in colonoscopy screening by age and gender. CRC is a growing threat all over the globe due to globalization, industrialization, and urbanization. Although it has a low incidence (<6.12/100,000 population), it has been increasing for the past two decades. High rates are found in Australia and Northern Europe; while neighboring countries such as Turkey, Iran, Saudi Arabia, and Jordan have higher rates. Epidemiological projections indicate concerning trends, and Iraq may reach Western IP by 2060 [19]. In the current study, patients who had undergone colonoscopy at the age of <50 were significantly associated with the presence of colorectal adenocarcinoma. This agrees with other studies done in the past in Iraq. CRC occurs in both old and young patients, and the symptoms are the same. Weakness and fatigue are observed in both groups. Most patients over 50 years undergo left colorectal adenocarcinoma [20]. Furthermore, our center found a strong correlation between male gender and the presence of colorectal adenocarcinomas. This is the same as global studies on colorectal cancer, which show higher prevalence in males than in females [21]. This difference may have been the result of differences in genetics, diet, and lifestyle [16]. The study shows colonoscopy is most used for gastrointestinal bleeding, altered bowel habits, and chronic abdominal pain, reflecting underutilization of screening compared to developed countries and a lower average patient age in this Kurdish-inhabited region. However, several limitations should be noted. First, the retrospective design and reliance on hospital records may have introduced selection bias, particularly due to excluded cases with incomplete data or inadequate bowel preparation. Second, the single-center nature limits generalizability to other regions in Iraq with differing demographics or healthcare practices. Third, the small number of adenocarcinoma cases ($n = 27$) resulted in wide CIs, reducing the precision of risk estimates. In addition, the study did not include follow-up data to assess long-term outcomes or adherence to surveillance guidelines. Finally, cultural and socioeconomic factors specific to Kurdistan/Iraq, such as healthcare accessibility and patient compliance, may further restrict the applicability of findings to other populations. Despite these limitations, this study highlights critical trends in colorectal pathology and underscores the need for expanded screening programs in Iraq.

5. CONCLUSION

This research demonstrated that the most common indications for colonoscopy include lower gastrointestinal bleeding, altered bowel habits, and chronic abdominal pain, with a lower frequency of screening colonoscopies in Kurdistan/Iraq, compared to developed countries. The age of patients undergoing colonoscopy in Kurdistan/Iraq is younger than that in developed nations, suggesting potential underutilization of screening in the region. The observed female predominance may be attributed to socioeconomic or cultural factors. The overall diagnostic yield was 62.43%, with the highest yields observed for rectal mass and anemia. The quality of bowel preparation in Iraq was found to be superior to international standards, although the ADR was lower than recommended levels. The incidence of CRC is increasing, particularly among adults aged 40–49 years, with younger patients and males being disproportionately affected.

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