POLYP AND ADENOMA DETECTION RATE AND EVALUATION OF DIFFERENT POLYP RETRIEVAL METHODS IN PATIENTS UNDERGOING COLONOSCOPY IN KURDISTAN CENTER FOR GASTROENTEROLOGY AND HEPATOLOGY/SULAIMANI CITY

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ABSTRACT

Background

Colorectal carcinoma is a common malignancy in Sulaimani city. Thousands of colonoscopies are conducted yearly for screening and diagnosis of colorectal pathologies, especially colorectal polyps and colorectal carcinoma. High-quality colonoscopy is the key to its success in detecting colorectal lesions like polyps, cancers.

Objectives

To assess the polyp detection rate, the adenoma detection rate and evaluate different polyp retrieval methods in patients undergoing colonoscopy in Sulaimani city

Patients and Methods

A clinical perspective follows up a study conducted in Kurdistan centre of Gastroenterology and Hepatology (KCGH) in Sulaimani city-Kurdistan region/ Iraq for one year from 1st November 2019 to 31st October 2020 on 2000 patients undergoing colonoscopy. All the patients were examined and diagnosed by the researcher.

Results

The polyp detection rate among patients undergoing colonoscopy was (34%), while the adenoma detection rate among patients undergoing colonoscopy was (22.1%); ADR was 22.7% for males and 21.3% for females. The mean age of patients who had polyps was significantly higher than those who had no polyps ($p<0.001$). The mean age of patients with adenomatous polyps was significantly higher than the mean age of patients with non-adenomatous polyps ($p<0.001$). The polyp retrieval rate was (92%). There was a significant association between failure in polyps' retrieval and diminutive polyps' size ($p=0.01$).

Conclusion

The polyp detection rate and adenoma detection rate in this study were consistent with the international rate. The polyp retrieval rate is within the acceptable international rate, although retrieval methods varied according to the size and location of the polyps.

Keywords: *Colorectal carcinoma, Colonoscopy, Polyps, Adenoma.*

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INTRODUCTION

Colorectal cancer (CRC) is the third most diagnosed cancer and is the fourth leading cause of death worldwide. Around 1.4 million new cases and nearly 700,000 deaths were recorded in 2012 due to colorectal cancer [1].

In most countries, colorectal cancer has increased [2]; considering the demographic estimates, the global burden of CRC is expected to increase by 60% and reaches more than 2.2 million new cases and 1.1 million deaths by 2030. The distribution of CRC varies across parts of the world; more than two-thirds of all cases and about 60% of all deaths occur in countries with a high or very high Human development index (HDI) [3].

In Eastern Europe, Asia and South America with medium HDI, the incidence and mortality of colorectal cancer is increasing. While in the countries of the United States, Australia, In New Zealand and several Western European countries with a very high HDI level, the incidence and morbidity of the disease have remained steady [4].

This disease can be considered an indicator of socio-economic development, and in countries undergoing a significant change in development, their incidence increases with a daily increasing HDI [2]. Furthermore, increased prevalence is associated with changes in the generations, diet patterns, obesity and lifestyle factors in developed countries. It is also observed that mortality increased, although further improvements in survival through adopting best practices for its treatment and management [3,5]. Therefore, this study investigates the epidemiology of incidence and mortality of cancer in 185 countries and its relationship with the HDI index in 2018 [6].

Unfortunately, the colorectal carcinoma is asymptomatic until later stages that are characterized clinically by abdominal pain, changes in bowel habits, and bleeding per rectum. These clinical features are not helpful in the recognition of colorectal carcinoma in the early stages. Studying molecular genetics of colorectal carcinoma clarified that the natural history of the disease started with one crypt and numerous gene mutations slowly over ten years that initiate the polyps that develop to carcinoma that may metastasize. This long natural history helps in providing an opportunity for early diagnosis and prevention of carcinoma by polyp removal and decreasing the morbidity and mortality of colorectal carcinoma [8]. The colonoscopy is regarded as the primary diagnostic method applied in that regard. However, other screening methods are available, but finally, colonoscopy is the final common path to remove any lesion [7, 8].

The adenoma detection rate (ADR) is a primary quality measure for colonoscopy. It is defined as the average of patients with at least one colorectal adenoma detected from all patients examined by an endoscopist [9]. In addition, many guidelines suggested the ADR for colonoscopy quality indicator with a cut-off of 25% for both genders with the age of 50 years and more [9, 10]. Despite these benefits, the ADR is not always documented in colonoscopy reports, and it needs integration of endoscopy and pathology reports. Indeed, the ADR overrides the serrated polyp pathway, which is a common precursor and responsible for one-third of developing colorectal carcinoma [11, 12].

For that, the polyp detection rate (PDR) is a better surrogate for adenoma detection rate with more feasibility and applicability as a quality indicator of colorectal carcinoma screening. The PDR is defined as the average of screened patients with colonoscopy in which at least one polyp is removed. Many advantages of PDR are that it is more easily calculated and strongly linked to ADR [13, 14]. Many factors affect the ADR and the PDR, like patients' sociodemographic factors, quality of preparing the bowel, endoscopist skill and withdrawal time [15, 16].

In clinical practice, the histology examination of resected polyps is essential in planning the screening interval, although many researchers recommended neglecting this policy. The histology examination of resected polyps is recommended to exclude colorectal carcinoma, to know the pre-malignant potential, and as a result, to plan the post-polypectomy surveillance [17].

Furthermore, the polyp retrieval ratio is the leading quality indicator for screening colonoscopy. The European Society of Gastrointestinal Endoscopy reported that more than 90% of resected polyps must be retrieved for histology examination [18]. Till now, the factors related to the failure of retrieved polyps are not fully studied, and although many methods to retrieve polyps are mentioned. However, the advantages and disadvantages of each method are not well characterized [19].

Unfortunately, the incidence rate of colorectal carcinoma in Sulaimani city in increased to reach 4.6% [20] and is considered as the most common

carcinoma in this city [21] may be related to prevalent factors such as family history, obesity, smoking, and other environmental factors [22]. For all these reasons and the scarcity of studies on this topic discussing the colonoscopy effectiveness and quality, this study was conducted and aimed to assess the polyp detection rate, adenoma detection rate and evaluate different polyp retrieval methods in patients undergoing colonoscopy in Sulaimani city

PATIENTS AND METHODS

The present study is a prospective cohort study conducted in the Kurdistan centre of Gastroenterology and Hepatology (KCGH) in Sulaimani city-Kurdistan region/ Iraq during a one-year duration from 1st November 2019 to 31st October 2020. The study population were Participants who visited or were referred to KCGH with Gastrointestinal symptoms like bleeding per rectum, abdominal pain, or patients that have unexplained anemia, positive for a faecal occult blood test (FOBT), Fecal Immunochemical Test (FIT), or those referred for surveillance, screening colonoscopy to KCGH.

Two thousand patients undergoing colonoscopy were selected after eligibility to inclusion and exclusion criteria.

Ethical considerations were applied according to Helsinki Declaration by taking approval of the study from the Ethical Committee of Kurdistan Board and Kurdistan Center of Gastroenterology and Hepatology and oral and written informed consent of patients in addition to taking into consideration the confidentiality of patients' data, later the patients were managed accordingly.

Inclusion criteria for the selected sample were patients over the age of 16 years undergoing routine colonoscopy (surveillance, diagnostic, therapeutic), the patient can give oral and written informed consent, adequate colonic preparation, and cecal intubation done and ileal intubation when indicated.

In addition, the exclusion criteria were known coagulopathy, history of inflammatory bowel diseases, severe cognitive impairment and poor general health defined as an American Society of Anesthesiologists (ASA) class > 3.

The Patients received 4 L PEG (Fortrans®, Colopeg) split dose in which divided into 2 L consumed from 7-9 pm on the day preceding the colonoscopy, and 2 L on the day of the colonoscopy, taken no earlier than 4 hours before the scheduled appointment and completed a minimum of 90 min before the procedure.

The data was collected by the researcher directly from patients, and the colonoscopic findings and retrieval time were recorded. The questionnaire included the age of patients (mean ± standard deviation), gender (male or female), indications of colonoscopy, characteristics of the polyps (size, location, histopathology and resection techniques), polyp retrieval methods and retrieval times were recorded.

The patients were followed up for recording results of histopathology of the polyps and late complications of post-polypectomy bleeding.

Calculating the PDR and ADR

• PDR = (number of examinations with polyps/total number of examinations) × 100

• ADR = (number of examinations with adenomas/total number of examinations) × 100.

The gastroenterologists performed the colonoscopies using the Olympus Evis EXERA II platform, Optera colonoscope CF-H170L and Elvis Lucera Elite system, Olympus America EVIS EXERA III | procedures.

Not all the stations featured Narrow Band Imaging (NBI), so we finally depended on histopathology results to characterize the polyps.

We have sent the polyps to different pathologists in different places. Currently, a polyp retrieval ratio higher than 90% is a quality indicator in screening colonoscopies. In clinical routine, the polyp sizes were estimated: 1) by an exhaustive expert examination, 2) by comparing the polyp size with open biopsy forceps that span a known measure, or 3) by probe tools [23].

The data collected were analyzed statistically by Statistical Package of Social Sciences software (SPSS-version 22). Chi-square and Fissures exact test were applied for analyzing the categorical, while independent sample t-test and one way ANOVA analysis test were applied for analysis of continuous variables. The level of significance (p-value) was regarded statistically significant if it was 0.05 or less.

RESULTS

This study included 2000 patients undergoing colonoscopy with a mean age of 35±10.5 years and predominance of the male gender compared to the female gender (57% vs 43%). The common indications for colonoscopy were abdominal pain (16.5%), bleeding per rectum (16.4%), change in bowel habit (12.5%), chronic diarrhoea (10.8%), anaemia (9%), screening (7.5%), Table 1. The polyp detection rate among patients undergoing colonoscopy was (34%), while the adenoma detection rate among patients undergoing colonoscopy was (22.1%); ADR was 22.7% for males and 21.3% for females, Figures 1-3. The mean age of patients with positive polyps was significantly higher than that of patients with negative polyps ($p<0.001$). No significant differences were observed between patients with positive polyps and patients with negative polyps regarding the gender of patients ($p=0.25$) Table 2. The mean age of patients with positive adenoma was significantly higher than the mean age of patients with negative adenoma ($p<0.001$). No significant differences were observed between patients with positive adenoma and patients with negative adenoma regarding the gender of patients ($p=0.47$), Table 3. Regarding polyps' characteristics, the polyps' sizes were distributed as follows; diminutive (45.2%), small (39.1%) and large (15.7%). The main polyps' locations were sigmoid (29.5%), descending colon (24.5%), ascending colon (14.1%), transverse colon (13.8%), etc. The polyp's histopathology was commonly tubular adenoma (51.5%), followed by; inflammatory (13.7%), hyperplastic (12%). Polyps' resection techniques were cold forceps polypectomy (53.8%), cold snare polypectomy (30.4%), hot snare polypectomy (14.7%) and endoscopic mucosal resection (1.1%), Table 4.

The mean age of patients with polyps was significantly higher among patients with polyps resected by hot snare polypectomy ($p=0.01$). No significant differences were observed between patients with polyps resected by different techniques regarding the gender of patients ($p=0.4$). The mean withdrawal time was significantly longer among patients with polyps resected by endoscopic mucosal resection ($p<0.001$). There was a highly significant association between large polyps and resection by hot snare polypectomy ($p<0.001$), Table 5.

The polyp's retrieval rate among patients with polyps was (92%), while failure was observed in (8%) of patients with polyps, Figure 4.

No significant differences were observed between patients with retrieved polyps and patients with not retrieved polyps regarding patients age ($p=0.87$), gender ($p=0.51$) and resection techniques ($p=0.34$). There was a significant association between polyps' retrieval failure and diminutive polyps' size ($p=0.01$), Table 6.

The polyp retrieval was more likely by biopsy forceps than other methods ($p<0.001$).

A highly significant association was observed between failure of polyps' retrieval and suction technique ($p<0.001$). There was a highly significant association between each of suction and CFP polyps' retrieval methods and diminutive polyps' size, while large polyps' sizes were retrieved by Snare, Basket and Rothnet methods ($p<0.001$). Mean retrieval time was significantly longer among polyps retrieved by the Rothnet method while shorter among polyps retrieved by suction technique ($p<0.001$), Table 7.

Table 1. General characteristics of patients undergoing colonoscopy.

Variable	No.	%
Age Mean ± SD (35±10.5 years)		
Gender		
Male	1140	57.0
Female	860	43.0
Indications for colonoscopy		
1-GI bleeding		
Bleeding per rectum	328	16.4
Anaemia	180	9.0
Melena	42	2.1
Positive FIT/FOBT	77	3.8
2-change in bowel habit		
Chronic diarrhoea	219	10.8
Constipation	102	5.1
Change in bowel habit	250	12.5
3-screening groups		
For polypectomy	118	5.9
Screening	150	7.5
Surveillance	83	4.1
4-Others		
Abdominal pain	330	16.5
Cancer of unknown primary	10	0.5
Abnormal colonic imaging	13	0.6
High faecal calprotectin	32	1.6
Abdominal mass	8	0.4
Significant unexplained weight loss	43	2.1
Recurrent haemorrhoid after hemorrhoidectomy	15	2.1
Total	**2000**	**100.0**

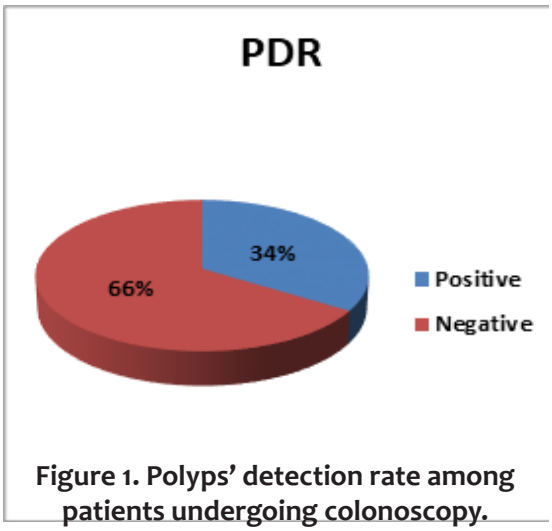

Figure 1. Polyps' detection rate among patients undergoing colonoscopy.

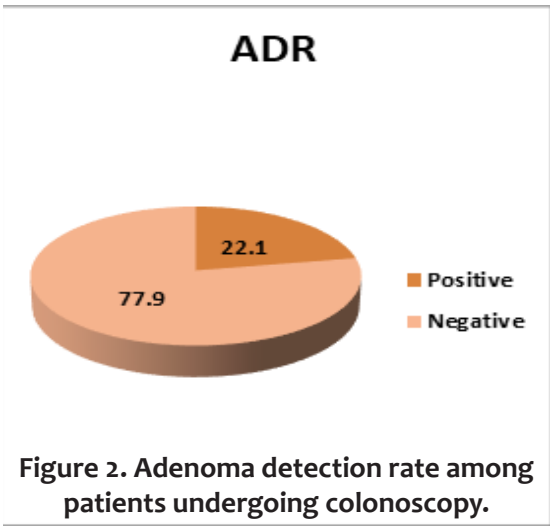

Figure 2. Adenoma detection rate among patients undergoing colonoscopy.

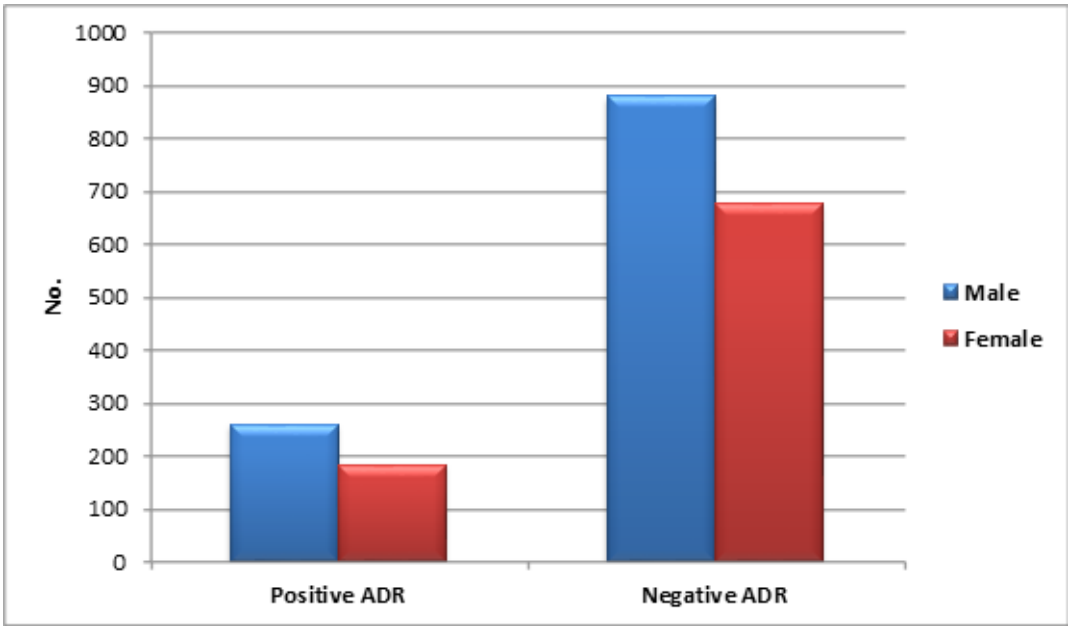

Figure 3. Adenoma detection rate among patients undergoing colonoscopy according to the gender of patients.

Table 2. Distribution of Age/Gender characteristics for patients undergoing colonoscopy according to PDR.

Variable	Positive PDR	Negative PDR	P
Age (years)			**<0.001**
Mean±SD	48.5±8.7	41.1±9.3	
Gender			
Male no. (%)	400 (58.8)	740 (56.0)	**0.25 NS**
Female no. (%)	280 (41.2)	580 (44.0)	

*S=Significant, NS=Not significant.

Table 3. Distribution of Age/Gender characteristics for patients undergoing colonoscopy according to ADR.

Variable	Positive ADR	Negative ADR	P
Age (years)			**<0.001**
Mean ± SD	46.0±10.2	38.1±6.2	
Gender			
Male no. (%)	259 (58.6)	881 (56.5)	**0.47 NS**
Female no. (%)	183 (41.4)	677 (43.5)	

*S=Significant, NS=Not significant.

Table 4. Polyp's characteristics.

Variable	No.	%
Polyp's size		
Diminutive (≤5 mm)	307	45.2
Small (6-9 mm)	266	39.1
Large (≥10 mm)	107	15.7
Polyps' location		
IC valve	9	1.3
Cecum	29	4.2
Ascending colon	96	14.1
Hepatic flexure	27	3.9
Transverse colon	94	13.8
Splenic flexure	23	3.4
Descending colon	166	24.5
Sigmoid	200	29.5
Rectum	36	5.3
Polyps' histopathology		
Unknown	54	7.9
Tubular adenoma	350	51.5
Villous adenoma	45	6.6
Tubulovillous adenoma	30	4.4
Serrated adenoma	17	2.5
Inflammatory polyp	93	13.7
Hyperplastic polyp	81	12.0
Mucosal polyp	5	0.7
Lymphoid aggregate	3	0.4
Cancer	2	0.3
Polyps' resection techniques		
Hot snare polypectomy (HSP)	100	14.7
Cold snare polypectomy (CSP)	207	30.4
Endoscopic mucosal resection (EMR)	7	1.1
Cold forceps polypectomy (CFP)	366	53.8
Total	**680**	**100.0**

Table 5. Distribution of general characteristics for patients with polyps according to resection techniques.

Variable	HSP	CSP	EMIR	CFB	P
Age (years)					
Mean±SD	52±10.6	48±12.5	50±11	47±12	**0.01**
Gender					
Male no. (%)	52 (52.0)	157 (51.1)	3 (42.8)	209 (57.1)	**0.4 NS**
Female no. (%)	48 (48.0)	150 (48.9)	4 (57.2)	157 (42.9)	
Withdrawal time (minutes)					
Mean±SD	12.5±6.9	10.7±4.5	19±3.5	9.1±5.3	**<0.001**
Polyp's size					
Diminutive no. (%)	0 (0)	37 (17.9)	0 (0)	270 (73.8)	
Small no. (%)	0 (0)	170 (82.1)	0 (0)	96 (26.2)	**<0.001**
Large no. (%)	100 (100.0)	0 (0)	7 (100.0)	0 (0)	

***S=Significant, NS=Not significant.**

Table 6. Distribution of general characteristics for patients with polyps according to polyps' retrieval.

Variable	Polyps retrieved	Polyps not retrieved	P
Age (years)			
Mean±SD	49.1±9.2	48.9±9.3	**0.87 NS**
Gender			
Male no. (%)	371 (59.3)	29 (53.7)	**0.51 NS**
Female no. (%)	255 (40.7)	25 (46.3)	
Polyps size			
Diminutive no. (%)	276 (44.1)	31 (57.4)	
Small no. (%)	246 (39.3)	20 (37.1)	**0.01**
Large no. (%)	104 (16.6)	3 (5.6)	
Resection techniques			
HSP	93 (14.9)	7 (12.9)	
CSP	195 (31.1)	12 (22.2)	**0.34 NS**
EMR	7 (1.1)	0 (0)	
CFB	331 (52.9)	35 (46.9)	

***NS=Not significant.**

Table 7. Distribution of polyps' retrieval characteristics for patients with polyps according to retrieval methods.

Variable	Suction& Trap	CFP	Alligator	Snare	Basket	Rothnet	P
Total polyps							**<0.001 S**
Mean±SD	65±18	326±73	131±17	38±10.6	25±4	41±2	
Polyps' retrieval							
Success no. (%)	37 (56.9)	316 (96.9)	118 (90.1)	38 (100.0)	24 (96.0)	39 (93.5)	**<0.001 S**
Failure no. (%)	28 (43.1)	10 (3.1)	13 (9.9)	0 (0)	1 (4.0)	2 (6.5)	
Polyp's size							
Diminutive no. (%)	38 (58.5)	195 (59.8)	43 (32.8)	0 (0)	0 (0)	0 (0)	**<0.001 S**
Small no. (%)	27 (41.5)	131 (40.2)	88 (67.2)	0 (0)	0 (0)	0 (0)	
Large no. (%)	0 (0)	0 (0)	0 (0)	38 (100.0)	25(100.0)	41 (100.0)	
Polyps' retrieval time (seconds)							**<0.001 S**
Mean±SD	10.5±2.3	15.5±4.1	17±4.4	20±8.6	32±7.8	35.5±14.1	

*S=Significant.

DISCUSSION

The colonoscopy is a safe, accurate, well-tolerated and commonly used tool for screening and diagnosing colorectal carcinoma. The quality indicator for colonoscopy was divided into; structural indicators (health care environment), process indicators (ADR, PDR and adequate biopsy sampling of ulcerative colitis) and outcome indicators (low death rate by CRC or perforation by colonoscopy) [24].

In the present study, the polyp detection rate among patients who undergone colonoscopy was (34%). This PDR is higher than the PDR of (16.44%) reported by a recent Iraqi study among 1380 patients who had undergone colonoscopy in two hospitals in Kerbala city [25]. This higher PDR of the present study may indicate a better quality of colonoscopy in our centre. Furthermore, our study PDR is higher than PDR of (27%) among 2964 patients undergoing colonoscopy recorded by Murphy et al. [26] study in Ireland and higher than the PDR of (24%) detected by Cooper et al. [27] study in the USA among 1.8 million colonoscopies. The current study showed that the adenoma detection rate among patients undergoing colonoscopy was (22.1%). This ADR detected by our study is lower than the results of Pu et al. [28] study in Australia, which found that among 2675 colonoscopies done by fifteen endoscopists, the ADR was (32.2%). Generally, the ADR should be (15%) as a minimum [29]. In the present study, the ADR was 22.7% for males and 21.3% for females. These findings are near to the recommendations of many societies like ASGE (American Society for Gastrointestinal Endoscopy), ACG (American college of gastroenterology) Taskforce that have recommended a new ADR target of 25% (rates of 30% are recommended for men and 20% for women) as an indicator for the quality of colonoscopy [30, 31]. However, A prospective Chinese study carried out by Wang et al. [32] on 1058 colonoscopies found that PDR was (36.9%) and the ADR was (24.6%) and also revealed that risk factors affecting ADR were age, withdrawal time, history of adenoma and diabetes mellitus, while the gender was not affecting the ADR. In the present study, the mean age was increased with positive PDR and ADR ($p<0.001$). These findings are in agreement with the results of the Karsenti et al. [33] study in France and the Asadzadeh Aghdaei et al. [34] study in Iran. The Present study reported that the

common indications for colonoscopy were abdominal pain (16.5%), bleeding per rectum (16.4%), change in bowel habit (12.5%), while only 7.5% of colonoscopies were for screening. This finding is inconsistent with the results of Boroff et al.'s [35] study in the USA, which reported the screening as a common indication for colonoscopy (49.2%), followed by surveillance (29.3%). This difference is attributed to the lack of established screening programs in our area, like many nearby countries.

The current study showed that the mean age of patients with polyps was significantly higher among patients with polyps resected by hot snare polypectomy ($p=0.01$). This finding is similar to the results of the Isohata et al. [36] study in Japan, which reported that a better resection technique for elderly patients during colonoscopy was hot snare polypectomy. Our study found that mean withdrawal time was significantly longer among patients with polyps resected by endoscopic mucosal resection ($p<0.001$). Similarly, Backes et al. study in the Netherlands reported a longer withdrawal time of endoscopic mucosal resection as compared to endoscopic submucosal dissection [37]. The Present study also revealed a significant association between large polyps and resection by hot snare polypectomy ($p<0.001$).

This finding coincides with the results of Yamamoto et al. study in Japan, which found that hot snare polypectomy was the appropriate resection technique for large polyps [38].

In the current study, polyps' retrieval rate among patients with polyps was (92%). This rate is acceptable as more than (90%) retrieval rate is recommended by the American Society for Gastrointestinal Endoscopy, the European Society of Gastrointestinal Endoscopy, and the British Society of Gastroenterology, the Joint Advisory Group on GI Endoscopy, the Association of Coloproctology of Great Britain and Ireland (30). In our study, there was a significant association between failure in polyps' retrieval and diminutive polyps' size ($p=0.01$). Consistently, Komeda et al.'s [39] study reported that risk factors for polyp retrieval failure were small polyp size, sessile polyps and cold snare polypectomy.

The present study found that mean total polyps was significantly higher retrieved by CFB retrieval method than other methods ($p<0.001$). This finding is consistent with the results of the Chien et al. [40] study in Taiwan. Our study showed a highly significant association between each of suction and CFP polyps retrieval methods and diminutive polyps' size, while large polyps' sizes were retrieved by Snare, Basket and Rothnet methods ($p<0.001$). Tranquillity et al.'s [41] study in Italy documented that CFP and suction techniques are better for diminutive polyps. Our study found that mean retrieval time was significantly longer among polyps retrieved by the Roth net method, while shorter among polyps retrieved by suction technique ($p<0.001$). These findings are similar to reports of Diehl et al.'s [42] study in the USA, which revealed a shorter time for suction and a longer time for the Roth net method during colonoscopy.

In this study, a new method is used for polyp retrieval, which is the Suction and trap method; it was an ideal method for diminutive polyps, small enough to enter the channel to be trapped by a gauze piece at the outlet before going to the sucker bowl, this finding is consistent with results of Ashish Dua et al. [43] study.

In conclusion, the polyps' detection rate and adenoma detection rate for patients undergoing colonoscopy in Kurdistan Center for Gastroenterology & Hepatology/ Sulaimani City are good indicators for the quality of colonoscopies but affected by the age of patients. The polyps' retrieval rate is within acceptable international rates but affected by polyp's size. In this study, a new polyp retrieval method is tested, which is the suction and trap method for diminutive polyps.

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Conflict of interest

Declared none.

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