Volume 53 | Issue 1

Article 10

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ORIGINAL STUDY

Prevalence of Colorectal Polyps and Associated Risk Factors in Egyptian Population: A Single Center Study

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Abstract

Background: **Intestinal polyps are noticeable mucosal outgrowths that extend into lumen of gastrointestinal tract. In adults, the most frequently detected polyps are adenomatous polyps which are thought to be precursors of large bowel cancer. Colonoscopy is the most widely accepted method for colon cancer screening. Early detection and removal of adenomas can significantly reduce risk of colorectal cancer hence; it is of great importance to evaluate the prevalence of colorectal polyps in Egyptian population by diagnostic colonoscopy and associated risk factors.**

Objective: **detect the prevalence of colorectal polyps in Egyptian population and associated risk factors.**

Patients and methods: **A cross-sectional study conducted on a total 551 patients attended to the gastrointestinal endoscopic unit at Mansoura Specialized Medical Hospital during the interval from August 2021 to May 2022.**

Results: **The prevalence of colorectal polyps was 23.6%, 18.9% of these polyps were benign and 4.7% were malignant. The number of polyps was greater in the left colon (47.7%) than that of the right side (44.6%). The most prevalent type was adenomatous polyps (30%), then hyperplastic polyps (28.5%). Colorectal polyps were more prevalent in male sex, older age, urban residents. A statistical significance was also found between colorectal polyps and family history of cancer colon or polyps, smoking, unhealthy diet, overweight, physical inactivity, DM and hypertension.**

Conclusion: **The prevalence of colorectal polyps was 23.6%, 18.9% of these polyps were benign and 4.7% were malignant. Several factors play an essential role in their unhealthy diet, positive family history, smoking, DM and hypertension.**

Keywords: Colorectal cancer, Colorectal polyps, Left colon, Right colon, Risk factors

1. Introduction

Intestinal polyps are grossly noticeable mucosal outgrowths that extend into lumen of gastrointestinal tract (Manfredi, 2010). They can either be pedunculated or sessile, single or part of polyposis syndromes and are distinguished by their gross appearance and overall size, the most prevalent sites are left colon, sigmoid colon and rectum (Veldurthi et al., 2014). In adults, the most frequently detected polyps are adenomatous polyps which are thought to be precursors of large bowel cancer, through a process called adenoma-carcinoma sequence, although only few adenomas develop to cancer, risk of cancer development rises with size,

villous component and severe dysplasia (Shussman and Wexner, 2014). Among non-neoplastic polyps, hyperplastic polyps are common, although they are thought to be benign, studies have revealed that some of the subsets of hyperplastic polyps have neoplastic potential (Wood, 2014). The third most common cancer in males and the second most common cancer in women both occur in the colon, colorectal cancer is the second most common cancer-related cause of death (Sawicki et al., 2021). Early detection and removal of adenomas can significantly reduce risk of colorectal cancer (Pamudurthy et al., 2020). Colonoscopy is the most widely accepted method for colon cancer screening and is considered the gold standard, polypectomy is

the most commonly performed therapeutic procedure to prevent development to CRC (Pamudurthy et al., 2020; Brenner et al., 2011). In the current study, we aimed to detect the prevalence of colorectal polyps in Egyptian population by diagnostic colonoscopy and to identify associated risk factors.

2. Patients and methods

This was a cross-sectional study included 551 Egyptian patients referred for colonoscopic examination at the gastrointestinal endoscopic unit, Specialized Medical Hospital, Mansoura University, Egypt during the interval between August 2021 and May 2022. This study included adult Egyptian patients aged at least 18 years old. According to age, included subjects were stratified into 5 groups: group 1 (18 y–29 y), group 2 (30 y–39 y), group 3 (40 y–49 y), group 4 (50 y–59 y), group 5 (≥60 y). Patients with history of colorectal cancer, colectomy, HIV and HBV infection were excluded. Additionally, patients with incomplete colonoscopy (due to non-satisfactory preparation or others) or incomplete clinical information were further excluded. All patients were subjected to detailed history enquiry with special concern on (the indication for colonoscopy, diet history, smoking history and family history of colorectal cancer (CRC) or colorectal polyps).

All patients were subjected to dedicated clinical examination with special focus on the vital data, local abdominal mass and digital rectal examination. Every patient was subjected to anthropometric measurements such as height, weight, and body mass index (BMI) using the standard equation: BMI = weight (kg)/height (m^2). Subjects were divided into 6 groups according to the WHO classification (2019) (World Health Organization, 2019). Basic laboratory investigations were withdrawn including complete blood count, total cholesterol, total triglyceride, virology were collected.

Full colonoscopy was performed by an experienced endoscopist in diagnostic and therapeutic endoscopy with high adenoma detection rate, after adequate preparation of the colon (via a split-dose polyethelene glycol) using colonoscopy PENTAX Video scope attached to EPK 1000 and 5000 processors with detailed examination of each colonic segment during withdrawal of the scope. Biopsies were taken from any polypoidal or mass lesion after detailed evaluation using enhanced virtual chromoendoscopy (I-scan mode). Size of the polyp was measured by either the biopsy forceps technique or according to the snare size. Furthermore, resectable polypoidal lesions were excised using standard

polypectomy techniques, hot snare is used for large polyps more than 2 cm while cold snare polypectomy is the standard for small polyps less than 1 cm. There is debate regarding polyps between 1 and 2 cm. For instance: hot-snaring polypectomy (Fig. 1b and 2b). All biopsies and pathological specimens were examined by a pathologist blinded to the results of endoscopy. Left colon includes the rectum, sigmoid and descending colon till the splenic flexure, while right colon includes the transverse till the hepatic flexure and lastly the ascending colon and caecum.

2.1. Assessment of bowel preparation quality

2.1.1. Ottawa bowel preparation scale

The OBPS evaluates mucosal cleanliness by colon segment, including the right colon, mid colon, and recto sigmoid colon, on a scale of 0 (excellent) to 4 (inadequate) for each and scoring is done prior to washing and suctioning. The OBPS evaluates fluid
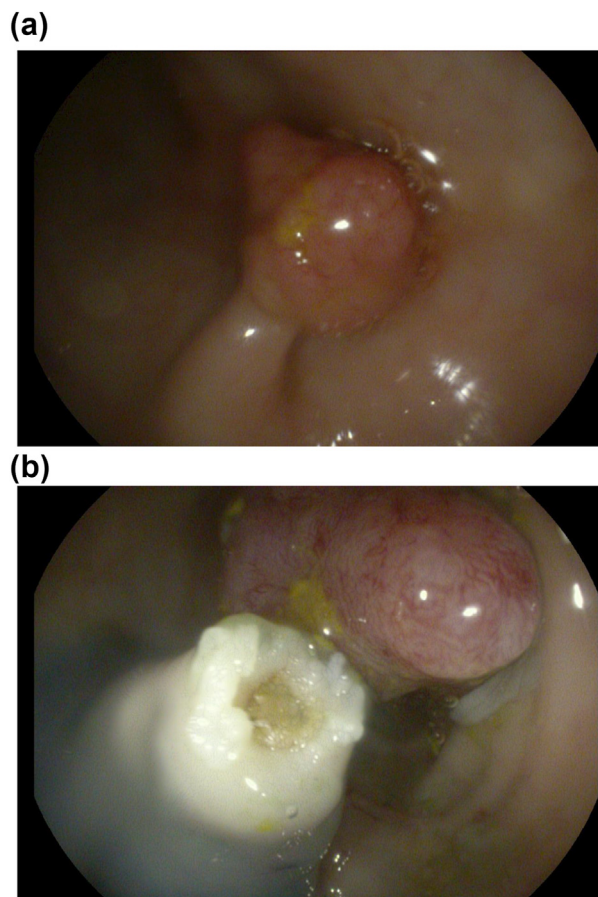

Fig. 1. (a): Pedunculated polyp at the sigmoid colon with endoscopic pit-pattern coping with tubulovillous adenoma (b). After hot-snaring polypectomy.
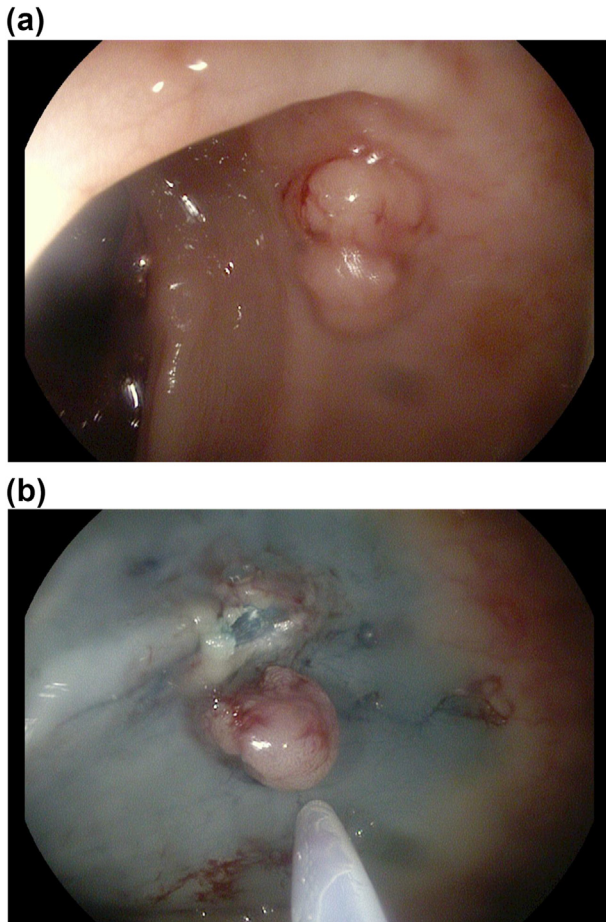
(a)

(b)

Fig. 2. (a). Sessile polypoidal lesion (Lateral spreading tumor) at the descending colon (b). Hot-snaring polypectomy was performed with enbloc excision.

quantity separately, with scores ranging from 0 (small volume) to 2 large volume for the entire colon (Rostom and Jolicoeur, 2004).

Total score (obtained by adding scores for each segment + total colon fluid score) range: Minimum 0 (excellent) to maximum 14 (inadequate). No threshold for adequate/inadequate provided.

2.2. Ethical consideration

The study was approved by the IRB of the Faculty of Medicine at Mansoura University (MS.20.11.1296) and was conducted in accordance with the Declaration of Helsinki and the consolidated Good Clinical Practice guidelines. The researcher explained the aim of the study to all participants who were free to participate in the study after informed consent and had the right to withdraw at any time. Ethics, values, culture, and beliefs of participants were respected.

2.3. Statistical analysis

Data analysis was performed by SPSS software, version 18 (SPSS Inc., PASW statistics for windows version 18. Chicago: SPSS Inc.). Qualitative data were described using number and percent. Significance of the obtained results was judged at the ($\leq$0.05) level. Chi−Square, Fischer exact test, Monte Carlo tests were used to compare qualitative data between groups as appropriate.

3. Results

The present study was cross-sectional study that was carried out on 551 cases underwent colonoscopies with different indications as described in (Table 1). Table 2 illustrates the colonoscopy findings in studied patients. The study revealed that 130 cases had polyps with prevalence 23.6%, 18.9% of

Ottawa Bowel Preparation Scale (by colon segment)		
Score	Rating	Description
0	Excellent	Mucosal detail obviously apparent. Almost no stool remnants; if fluid presents, it is clear, almost no stool residue.
1	Good	Mucosal detail is still apparent despite some turbid fluid or faeces remains without the requirement for washing or suctioning.
2	Fair	Mucosal detail is obscured by some turbid stool residual fluid, but suctioning makes it apparent and washing is not necessary.
3	Poor	Mucosal detail and contour are obscured by the stool; suctioning and washing allow for an accurate view.
4	Inadequate	Mucosal detail is obscured by solid faeces that are not removed by washing and suctioning.
Ottawa Bowel Preparation Scale (total colon fluid)		
Score	Rating/Description	
0	Small amount of fluid.	
1	Moderate amount of fluid.	
2	Large amount of fluid.	

Table 1. Complaint among studied cases.

Complaint	n = 551 (%)
Abdominal pain	102 (18.5)
Bleeding per rectum	140 (25.4)
Anemia	63 (11.4)
Chronic constipation	61 (11.1)
Chronic diarrhea	99 (18.0)
Screening	51 (9.3)
Melena	27 (4.9)
Weight loss	8 (1.5)

Table 2. Colonoscopy findings of the studied cases.

	n = 551 (%)
Colonoscopy	
Normal (No polyps)	421 (76.4)
Abnormal (polyps present)	130 (23.6)
Shape	n = 130
Sessile polyps (Paris 0Is)	77 (59.2)
Pedunculated polyps (Paris 0Ip)	20 (15.4)
Fungating Masses	14 (10.8)
Circumferential Masses	12 (9.2)
Mixed (sessile, with predominant nodules, Paris IIb-Is)	7 (5.4)
Size	n = 130
Small (<1 cm)	66 (50.7)
Large (>1 cm)	56 (43.1)
Mixed	8 (6.2)
Number	n = 130
Single	93 (71.5)
2–3	26 (20.0)
Multiple (>3)	11 (8.5)
Pathology	
Hyperplastic	37 (28.5)
Tubulovillous adenoma	31 (23.8)
Tubular adenoma	8 (6.2)
Inflammatory	19 (14.6)
Juvenile (Retention)	2 (1.5)
FAP	1 (0.8)
Malignant	26 (20.0)
Mixed (Hyperplastic -Adenoma)	6 (4.6)
Malignant	26 (20.0)
Benign	104 (80.0)
Site	n = 130 (%)
Caecum	18 (13.8)
Ascending colon	16 (12.3)
Hepatic flexure	11 (8.5)
Transverse colon	8 (6.2)
Splenic flexure	1 (0.8)
Descending colon	10 (7.7)
Sigmoid colon	13 (10.0)
Rectum	28 (21.5)
Recto sigmoid	6 (4.6)
Left colon	4 (3.1)
Whole colon (Right + left side)	10 (7.7)
Ileocecal valve	3 (2.3)
Right colon	2 (1.5)
Right side	58 (44.6)
Left side	62 (47.7)
Whole colon	10 (7.7)

these polyps were benign, and 4.7% were malignant. The most prevalent type was adenomatous type and it was reported in 39 patients (30%), then hyperplastic polyp that was reported in 37 patients (28.5%). The polyps were distributed in several segments of the examined colons but were highly prevalent in the left side of colon (47.7%). Colorectal polyps were significantly highly prevalent in males, older patients (46.9% aged more than 60 years). There was significant association between colorectal polyps (Table 3) and those with family history of cancer colon or polyps, smokers, urban residents and those with history of diabetes and hypertension. Table 4 illustrates the statistically significant association between presence of polyps and unhealthy diet (diet high in fats, salt, sugars, red meat, processed meat, low fiber, high intake of fast food and processed food), obesity (BMI >25) and physical non activity ($P < 0.001$). 46.2% of cases with polyps had unhealthy diet, 82.2% with BMI >25 and 65.4% were non-physically active. In Table 5 there was statistically significant association between presence of polyps and complaint of the studied cases ($P = 0.001$). Bleeding per rectum was detected among 34.6% & 22.6%, respectively for cases with and without polyps, also chronic constipation was detected among 15.4% & 9.7% for cases with polyps and no polyps, respectively.

4. Discussion

The third most common cancer in males and the second most common cancer in women both occur in the colon. Colorectal cancer is the second most common cancer-related cause of death. It accounts for 11% of all cancer diagnoses worldwide and is one of the cancers whose incidence is growing. Both morbidity and mortality at CRC are rising upward on an annual basis. Numerous elements, including genetic and environmental ones, may contribute to the growth of this illness (Sawicki et al., 2021).

In our study which included 551 subjects, we found that; 130 cases had colorectal polyps with prevalence 23.6%, 18.9% of these polyps were benign, and 4.7% were malignant. Many studies were carried out to find prevalence of colorectal polyps where the prevalence of colorectal polyps in Chinese population was 18.1% among the 3066 individuals studied by Pan et al. (2020). In the Egyptian community, the prevalence of colonic polyps and cancer was investigated in a number of studies where El-Badry et al., found that colonic polyps were found in 9.6% of cases and colorectal cancer was found in 8.8% of the patients who underwent examination (El-Badry et al., 2012).

As regards pathology of polyps, our study demonstrated that; the most common type of

Table 3. Relation between socio-demographic characteristics and presence of polyps among studied cases.

	No polyps n = 421(%)	Presence of polyps n = 130(%)	Test of significance
Age/years			
18−30	92 (21.9)	9 (6.9)	MC = 43.45
30−40	88 (20.9)	13 (10.0)	$P < 0.001$[a]
40−50	78 (18.5)	23 (17.7)	
50−60	75 (17.8)	24 (18.5)	
>60	88 (20.9)	61 (46.9)	
Sex			
Male	200 (47.5)	81 (62.3)	$\chi^2 = 8.70$
Female	221 (52.5)	49 (37.7)	$P = 0.003$[a]
Residency			
Urban	190 (45.1)	76 (58.5)	$\chi^2 = 7.07$
Rural	231 (54.9)	54 (41.5)	$P = 0.008$[a]
Special Habits (smoking)			
Non-smoker	354 (84.1)	78 (60)	$\chi^2 = 37.44$
Smoker (current)	47 (11.2)	43 (33.1)	$P < 0.001$[a]
Ex-smoker (Former)	20 (4.8)	9 (6.9)	
Family Hx (cancer colon or polyps)			
No Family Hx	410 (97.4)	104 (80)	$\chi^2 = 47.94$
Positive Family Hx	11 (2.6)	26 (20)	$P < 0.001$[a]
Medical history			
DM	62 (14.7)	60 (46.2)	$\chi^2 = 56.91$ $P < 0.001$[a]
Hypertension	75 (17.8)	53 (40.8)	$\chi^2 = 29.35$ $P < 0.001$[a]

χ^2, Chi−Square test; MC, Monte Carlo test.
[a] Statistically significant.

polyps was adenomatous polyps (30%) then hyperplastic polyps (28.5%). Likewise, a study by Soleimaninejad and Sharifian showed that the most prevalent form of polyps, adenomatous polyps, were reported by 58.3% of patients, followed by hyperplastic polyps, which were reported by 25.1% of patients (Soleimaninejad and Sharifian, 2020). Also, in Taiwan, a study by Wang et al., showed

Table 4. Relation between nutritional characteristics and presence of polyps among studied cases.

	No polyps n = 421(%)	Presence of polyps n = 130(%)	test of significance
Diet			
Healthy	355 (84.3)	70 (53.8)	$\chi^2 = 52.31$
Unhealthy	66 (15.7)	60 (46.2)	$P < 0.001$[a]
BMI			
Underweight	9 (2.1)	5 (3.8)	$\chi^2 = 325.61$
Normal weight	279 (66.3)	18 (13.8)	$P < 0.001$[a]
Overweight	126 (29.9)	16 (12.3)	
Obese grade 1	7 (1.7)	64 (49.2)	
Obese grade 2	0	22 (16.9)	
Obese grade 3	0	5 (3.8)	
Physical activity			
Active	324 (77.0)	45 (34.6)	$\chi^2 = 80.51$
Non active	97 (23.0)	85 (65.4)	$P < 0.001$[a]

χ^2: Chi−Square test.
[a] Statistically significant.

that; the prevalence of hyperplastic and adenomatous polyps was 11.1% and 16.1%, respectively, in the 1899 asymptomatic individuals (Wang et al., 2014). On the contrary, a study by El-Badry et al., demonstrated that hyperplastic polyps were present in 35.8% of polyps followed by mixed adenomatous and hyperplastic polyps in 29% (El-Badry et al., 2012).

As regards the site of polyps, our study demonstrated that; colorectal polyps were more prevalent in the left side than the right side where 44.6% of colorectal polyps were found in the right side. While, 47.7% of the polyps were found in the left side and 7.7% of the polyps were distributed in the whole colon. Likewise, a study by Soleimaninejad and Sharifian demonstrated that; the sigmoid colon had 28.6% of the polyps, the descending colon had 23.2%, and the rectum had 22.8% (Soleimaninejad and Sharifian, 2020). In the same line, Emadian et al., demonstrated that, the recto sigmoid area had 54% of the polyps, which is consistent with our findings (Emadian et al., 2016). On the contrary, Colonoscopies were done on 2400 patients by Qumseya et al., where 54% of polyps were found in the right side of the colon and 46% in the left (Qumseya et al., 2012).

The current study demonstrated that; there was statistically significant association between polyps and age. Among cases with polyps; 46% aged more than 60 years versus 20.9% among cases with no polyps. Many studies revealed that polyps were related to older age where Pan et al., discovered that colorectal polyps were considerably more common in people aged 56 to 65 (Pan et al., 2020). Also, a study by Lee and Kim, revealed that 42.5% of young people in the age group (40−49 years) had polyps, 55% in the middle age group (50−59 years),66.3% in the old age group (60−79 years) (Lee and Kim, 2020). This indicates that Aging affects the development of

Table 5. Relation between complaint and presence of polyps among studied cases.

Complaint	No polyps n = 421(%)	Presence of polyps n = 130(%)	test of significance
Abdominal pain	84 (20)	18 (13.8)	$\chi^{2MC} = 27.49$
Bleeding per rectum	95 (22.6)	45 (34.6)	$P = 0.001$[a]
Anemia	44 (10.5)	19 (14.6)	
Chronic constipation	41 (9.7)	20 (15.4)	
Chronic diarrhea	88 (20.9)	11 (8.5)	
Screening	43 (10.2)	8 (6.2)	
Melena	18 (4.3)	9 (6.9)	
Weight loss	5 (1.2)	3 (2.3)	

MC, Monte Carlo test.
[a] Statistically significant.

colonic polyps and this is consistent with our results.

The current study demonstrated that; there was a statistically significant correlation between polyps and sex where 62% of cases with polyps were males. In the same line, a Korean study by Yang et al., revealed that the prevalence of adenomas was 34.5% in men and 20.0% in women among individuals at average risk, and it grew yearly throughout the period of study (Yang et al., 2014). Also, Kim et al., reported that male gender could be considered as an independent predictor of colorectal adenoma (Kim et al., 2013).

The current study demonstrated that polyps and residence were statistically significantly associated. Among cases with polyps 58.5% were urban residence versus 45.1% among cases with no polyps. This is consistent with a study by Roman et al., who found that the proportion of urban residents was significantly higher than rural ones among patients with colonic polyps in Grodno population (Roman et al., 2020).

The current study demonstrated that; the polyps and history of smoking were statistically significantly associated. Among cases with polyps; 33.1% were smokers versus 11.2% among cases with no polyps. This came in agreement with most studies where Lee and Kim, found that current smokers had a greater prevalence of polyps by 2.642 in the young age group, 3.468 in the middle age group, and 3.104 in the old age group (Lee and Kim, 2020). Additionally, Wang et al. discovered that current smoking was an independent predictor for hyperplastic polyps and adenomatous polyps (Wang et al., 2014).

The current study demonstrated that; there was statistically significant association between polyps and family history of cancer colon or colorectal polyps. Among cases with polyps; 20% were with positive family history versus 2.6% among cases with no polyps. This came in agreement with the majority of studies where Song et al., found that; the siblings and offspring of patients with colorectal polyps are still at higher risk of developing CRC, especially early onset CRC, even after accounting for family history of the disease. First-degree relations of those with polyps might be screened early for CRC (Song et al., 2021).

With regard to diabetes mellitus (DM) and hypertension, our study demonstrated that; both DM and hypertension were significantly increased among cases with colorectal polyps compared to colorectal polyp's free ones. Likewise, Hsu et al., have found that; when compared to the control group, patients with T2DM had a greater incidence rate of developing colorectal polyps (Hsu et al., 2021). In accordance, Watanabe et al., showed that the prevalence of colorectal polyps was identified in 577 (43.8%) patients, with 57.6% (296/514) of those getting antihypertensive treatment and 35.0% (281/804) of those not receiving such treatment and this is consistent with our study (Watanabe et al., 2015). Conversely, Kim et al., found that no significant correlations were found between hypertension and development of colon polyps (Kim et al., 2013).

The current study demonstrated that; there was a statistically significant association between presence of polyps and unhealthy diet, obesity (↑ BMI >25) and physical non activity. This came in agreement with many studies where Fu et al., revealed that the risk of developing polyps was found to be independently correlated with obesity, a higher consumption of red meat, a low intake of fiber and a lower consumption of calcium (Fu et al., 2012). Also, Zhang et al. showed that men and women who participated in high levels of physical activity had lower incidence of colorectal polyps (Zhang et al., 2021).

The current study demonstrated that; there was statistically association between presence of polyps and complaint of the studied cases. Bleeding per rectum was detected among 34.6% and 22.6%, respectively for cases with and without polyps, also chronic constipation was detected among 15.4% and 9.7% for cases with polyps and no polyps, respectively. Likewise, a study by Soleimaninejad and Sharifian demonstrated that; the main symptom among patients was lower digestive haemorrhage 44.2% (Soleimaninejad and Sharifian, 2020).

5. Conclusion

The current study demonstrated that; the prevalence of colorectal polyps was 23.6%, 18.9% of these polyps were benign and 4.7% were malignant. Colorectal polyps were found more in the left side. Several factors play an essential role in their development which include advanced age, male sex, high BMI, physical inactivity, unhealthy diet, positive family history of colon cancer or colon polyps, smoking, DM and hypertension. This study provides strong evidence that lifestyle modification is important for the prevention of colorectal polyps. Regular screening for colorectal polyps particularly for highly predisposed subjects.

Sources of funding

Conflicts of interest

None.

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