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***Observational Study***

**Polyp detection rate and pathological features in patients undergoing a comprehensive colonoscopy screening**

Asadzadeh Aghdaei H *et al*. Prevalence and characteristics of colonic polyps

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**Abstract**

***AIM***

TO identify the prevalence, and clinic pathologic characteristic of colonic polyps among Iranian patients undergoing a comprehensive colonoscopy. We also determined the polyp detection rate (PDR), and adenoma detection rate (ADR).

***METHODS***

In this cross-sectional study, demographics and epidemiologic characteristicsof the 531 persons who underwent colonoscopies between 2014 and 2015 at Mehrad gastrointestinal clinic were determined. Demographics, indication for colonoscopy, colonoscopy findings, number of polyps and histopathological characteristics of the polyps were examined for each person.

***RESULTS***

Our sample included 295 (55.6%) women and 236 (44.4%) men, with the mean age of 50.25 years (SD = 14.89). Overall PDR was 23.5% (125/531). Adenoma detection and colorectal cancer detection rate in this study were 12.8% and 1.5%, respectively. The PDR in men (52.8%) was significantly higher than women (47.2%, *P* < 0.05). Polyps can be seen in most patients after the age of fifty. The average age of patients with cancer was significantly higher than in those with polyps (61.3 years *vs* 56.4 years, respectively, *P* < 0.05). The majority of the polyps were adenomatous. More than 50% of the polyps were found on the rectosigmoid part of the colon.

***CONCLUSION***

The prevalence of polyps and adenomas in this study is less than that reported in the western populations. In our patients, distal colon was more susceptible to develop polyps and cancer than proximal colon.

**Key words:** Polyp detection; Adenoma detection; Screening; Colonoscopy; Iran

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**Core tip:** One ofthe major reasons for colonoscopy is detection rate of colon polyps, such as the adenoma detection rate. Early diagnosis and endoscopic removal of adenomatous polyps is one of the main objectives for screening and prevention of colorectal cancer (CRC). Given that, only few studies are available in the national literature that assessed colorectal polyps, but none has explicitly noted the rate of polyp detection. Nevertheless, our study provides comprehensive information about clinical and epidemiological features of colorectal polyps. Therefore, the results of this study can provide a good infrastructure for the next preventive program and have clinical implication for CRC screening.

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**INTRODUCTION**

Colorectal cancer (CRC) is the third most common malignant disease in both men and women worldwide; accounting for more than 8% of mortality in the world with approximately 1.4 million new cases a year[1-4].

CRC is the third most common cancer in men and women in Asia[5,6]. In the Asia-Pacific region, the incidence varies between regions, with high incidence in Australia, and Eastern Asia, and low incidence in south-central Asia[7]. According to International Agency for Research on Cancer (IARC), the incidence of CRC in many Asian countries is similar in many western countries[8]. CRC is also the third most common cancer in Iranians, after excluding the skin cancers. It occurs at younger ages with an increasing trend similar in the Asia-Pacific countries[1,9]. These increasing rates may result from the young age-structure and low rates of colon cancer in older people of these countries[6,10,11].

Almost all CRCs develop from colorectal polyps. Over the period of ten years mostly of adenomatous polyps can be converted to colon carcinoma[12,13]. Given that the process of becoming of colorectal adenomas into adenocarcinoma is very long and slow[14], early detection and removal endoscopic of these precancerous lesions, is very effective in reducing the incidence and mortality rate of CRC[15-17].

CRC is a suitable disease for screening[18]. But due to a lack of comprehensive screening strategy and public acceptance, this program is not implemented in many countries. Nevertheless, access to the CRC screening is an important key to reduce the burden of CRC. Endoscopic screening is comprised of four techniques including: Sigmoidoscopy, colonoscopy, barium enema and computed tomographic colonography[19]. Colonoscopy is a highly specific and the most effective screening tool to detect colonic polyps and CRC[20].

Limited data is available in the national literature that assessed colorectal polyps[21-25]. Understanding of the prevalence of colorectal polyps especially adenomas in the general population would help clarify the efficacy of a CRC screening program. Therefore updating the current knowledge in the scope of colorectal polyps and CRC is essential. Hence, identifying the features of colon polyps (*e.g.*, distribution, location, and histology type) has great implications for developing national screening guidelines for CRC[26,27]. In this study, we aimed to determine the baseline polyp as well as adenoma prevalence in persons who underwent colonoscopies for various indications as well as opportunistic screening for CRC. We also assessed the polyp detection rate (PDR), adenoma detection rate (ADR), and to evaluate the clinical and histological characteristics of colorectal polyps in an Iranian patients and Iranian volunteers for CRC screening.

**MATERIALS AND METHODS**

***Study design***

All data will be extracted from a cross-sectional study and assessed the colonoscopy database and pathology reports maintained by Mehrad gastrointestinal clinic in Iran. We included all persons aged 15 to 85, who underwent their first time colonoscopy during 2014-2015. Patients who had previously identified with colon polyp or colorectal malignancies including CRC, colonic resection, active colitis, active diverticulitis and familial adenomatous polyposis were excluded from study. We collected the data on demographic variables, indications for colonoscopy, family history of colorectal malignancies. Family history was defined as having a first degree relative with CRC. For all colorectal lesions, data on clinical and pathological features (*i.e*., number, size, site and grade of dysplasia) were obtained. The study was approved by the Gastroenterology and Liver diseases research institute for gastroenterology and liver diseases, Shahid Beheshti University of Medical Sciences.

***Polyp classification***

All polyps identified during colonoscopy were biopsied or removed endoscopically and submitted for histopathology. The overall PDR was defined as the proportion of procedures in which at least one polyp was detected over the total number of colonoscopies. ADR was defined as the number of colonoscopies in which one or more adenomas was detected, divided by the total number of colonoscopies performed by the endoscopic[28].

Pathological features of colorectal lesions were determined using the World Health Organization (WHO) criteria[28] as follows: Hyperplastic and adenomatous polyps that were classifies as non-neoplastic polyps and neoplastic polyps respectively. Microscopically, the adenomas were categorized architecturally as serrated, tubular, tubular-villous, and villous.

The locations of the polyps were defined as (proximal and distal colon); proximal colon included transverse colon, hepatic flexure, ascending colon and cecum, distal colon included rectum, sigmoid, descending colon, and splenic flexure.

The polyp size was classified as small (< 5 mm), medium (5-9 mm), or large (> 10 mm). Estimation of polyp size was performed by the endoscopic using the diameter of the open biopsy forceps, which is about 8 mm. In the event of multiple polyps, only the size of the largest was considered for the purposes of analysis. Degrees of dysplasia observed in the adenomas were graded as low (mild, moderate) or high grade (severe). Other patients with no polyps were regarded as normal.

***Statistical analysis***

Categorical variables will be expressed as numbers and percentages. *χ*2 or Fisher’s exact test, where appropriate, will be used for analysis of categorical variables. Continuous variables will be expressed as medians, or as means and standard deviation (SD), and 95% confidence interval (CI) as appropriate. The student *t* test was used for comparisons of means. All analyses will be performed using SPSS version 21.0 (SPSS INC, Chicago, IL, United States). A two-tailed *P* < 0.05 was considered as statistically significant.

**RESULTS**

***Demographic and historical data***

During the period of study (2014-2015), 531 persons met the inclusion criteria. Our sample included 55.6% women and 44.4% men. The age range was 15-85 years with a mean of 50.3 ± 15.4 years and a median of 52 years. The patients were divided into two age-groups (≤ 50 and > 50 years). The most frequency of patients was over 50 years 52.9%. One hundred and fifty (28.2%) patients had a family history of polyps or CRC in our study.

The most common reasons for colonoscopy included; screening (asymptomatic adults’ aged 50 years and older and family history of CRC) in 22.6%, and then followed by lower gastrointestinal bleeding in 17.0%. Other indications for colonoscopy were classified as follows: 15.4% constipation, 13.9% diarrhea, 13.1% abdominal pain, 12.2% inflammatory bowel disease (IBD) and 5.4% other indications. Other referral indication includes bloating, reflux, weight loss, anemia, fatty liver and irritable bowel syndrome (IBS) (Table 1).

***Study outcomes and colonoscopy findings***

Based on colonoscopy findings, the overall PDR was 23.5% (125/531). According to histopathology results from 125 patients with at least one polyp, 54.4% of the lesions were neoplastic polyps and the other patients 45.6% had hyperplastic polyps (non-neoplastic polyps). The overall ADR in this study was 12.8% (68/531). The PDR in men (52.8%) was significantly higher than that in women (47.2%) (*P* < 0.05). The overall CRC was detected in 1.5% (8/531). CRC was detected in 62.5% of men and 37.5% of women (Table 2). The mean age of patients with polyp was 56.4 (SD = 13.5) years. Polyps can be seen in most patients after the age of fifty (69.6%). CRC was more frequently observed in patients with range of 60-80 years. The average age of patients with cancer was significantly higher than in those with polyps 61.3 (SD = 19.7) years *vs* 56.4 (SD = 13.5) year, respectively (*P* < 0.05) (Table 3). In addition the relationship of PDR and family history of CRC or polyps of the patients was assessed and this was found not to be statistically significant (*P* > 0.05), while all patients with CRC in this study had a family history (Table 4).

***Histopathological characteristics of the polyps***

Totally 138 polyps were removed by colonoscopy in this study. Among the 138 polyps; 56.5% were neoplastic polyps and the others were non-neoplastic polyps. All non-neoplastic polyps were hyperplastic. Among the 78 neoplastic polyps, the most common histologic types were tubular adenomas 48.7%, tubule-villous adenomas 28.2%, villous adenomas 12.8% and serrated adenomas 10.2%.

The prevalence of polyps in distal colon was higher than that of the proximal colon (68.1% *vs* 31.9%, respectively, *P* < 0.05). Accordingly, most of cancers were located in the distal colon compared with the proximal colon (75% *vs* 25%, respectively, *P* < 0.05) (Table 5). Overall polyps were frequently detected in rectum 32.0%, sigmoid 24.6%, transverse colon 16%, ascending and descending colon 10.1% and the others located in cecum 5%, splenic and hepatic flexure 2.1% (Table 6).

Data about the size of polyps were available for only 75 polyps; 33.3% were smaller than 5 mm as small size, 40% were between 5-9 mm as medium size and 26.7% were more than 10 mm as large size (Table 7). According to degree of dysplasia observed in the adenomas, most of patients 52.6% had mild grade, 24.4% had moderate and 23% had severe grade of dysplasia (Table 8).

**DISSCUSION**

The PDR and ADR rates, obtained in this study are low, when compared to the figures from most western and some Asian countries. In a large multicenter study from Italy, the median detection rates for polyp were 35%[29]. A large colonoscopy series from Spain reported PDR 45.8%[30]. Similar study from Mayo Clinic in United States and other study in France reported PDR of 49% and 35.5%, ADR of 31% and 17.7% respectively[31,32]. In some Asian countries like Korea, China and Thailand PDR and ADR rates was similar to report from Europeans and Americans[33-36]. However, our findings are similar to reports from Kuwait, Malaysia and Oman where PDR of 20% and ADR of 10%, 11.5% and 12.1% were reported respectively[37-39]. While in African countries like that Nigeria these rates were reported lower than our results (16.1%, 6.8% of PDR and ADR respectively)[40]. The mean age of the studied population was relatively young (50.3 years) and it might be decreased the ADRs because adenomas have been demonstrated in those older than 50 years of age.

The overall estimate for PDR in our study was 23.5%, while adenomas rate were found in 12.8% with significantly higher in men than women (52.8% *vs* 47.2% respectively, *P* < 0.05). This data are consistent with the other reports that support gender differences in the prevalence of colon polyps and cancer[27,40,41]

Older age is the most important predicator for the prevalence of adenomas, and cancer. In our study, the PDR and cancer prevalence reached a peak in the 6th decades of life. Nonetheless, the average age of patients with cancer was significantly higher than in those with polyps (61.3 years *vs* 56.4 years, respectively, *P* < 0.05). Studies from the Middle East and the western countries also mentioned significant increase the risk of CRC, in particular after the age of 50 years[24,28,42].

Based on increasing prevalence of CRC in the sixth decade of life, regular screening begins at age fifty. But People at higher risk of developing CRC should begin screening at a younger age[43,44].

The Tubular type was the most common histological feature of adenomas in the present study, in accordance with the results of other reports[21,27,45]. Polyps were detected significantly on distal (left sided) colon, comparable with results from Asian and the Western countries[46,47]. Nonetheless, because of the significance of adenomatous polyps and hyperplastic polyps presents in proximal colon, the location of polyps were not benefit for distinguishing between neoplastic and non-neoplastic polyps. So, complete colonoscopy is recommended in screening guidelines for colon cancer[43,48]. In addition, this study showed that only 56.6% of the polyps were found in the rectum and sigmoid region. Our study did not find any association between the age and location of polyps. This is in contrast with previous studies that showed that incidence of right sided polyps increased with increasing age[44].

If we considered the size of polyps, we observed that the hyperplastic polyps and tubular adenoma were always smaller than 10 mm as the results of this study. While tubulo-villous and villous adenoma were always bigger than 10 mm. So, remove the polyps which are larger than 10 mm is recommended[36,49].

The study faced some limitations; first, this study was not population-based; therefore, the selection bias of the study population must be kept in mind. Second, our sample included mostly symptomatic patients, in which the estimates may be different from screening studies with asymptomatic individuals. Nevertheless, the results of this study can provide a good infrastructure for the next preventive program and have clinical implication for CRC screening.

In conclusion, PDR, adenoma detection and CRC detection rate in this study were 23.5%, 12.8% and 1.5%, respectively. Most of the polyps and CRC were identified in patients aged 50 years or older. The majority of the polyps were adenomatous. More than 50% of the polyps were found on the rectosigmoid part of the colon. And finally, our study did not find any association between the family history and PDRs.

**COMMENTS**

***Background***

Colorectal cancer (CRC) is the third most common malignant disease in both men and women worldwide; accounting for more than 8% of cancer-related death in the world with approximately 1.4 million new cases a year. Almost all CRCs develop from colorectal polyps. CRC largely can be prevented by the detection and removal of adenomatous polyps, and survival is significantly better when CRC is diagnosed while still localize. When CRC is found at an early stage before it has spread, the 5-year relative survival rate is about 90%. But only about 4 out of 10 CRCs are found at this early stage. When cancer has spread outside the colon or rectum, survival rates are lower.

***Research frontiers***

Early diagnosis and endoscopic resection of adenomatous polyps is the main approach for screening and prevention of CRC. This study was aimed at identifying the prevalence, and clinic pathologic characteristic of colonic polyps among Iranian patients undergoing a comprehensive colonoscopy and also we determined the polyp detection rate (PDR), and adenoma detection rate (ADR).

***Innovations and breakthroughs***

Only few studies are available in the national literature that assessed colorectal polyps, but none has explicitly noted the rate of polyp detection. Nevertheless, the study provides comprehensive information about clinical and epidemiological features of colorectal polyps. Only few studies are available in the national literature that assessed colorectal polyps, but none has explicitly noted the rate of polyp detection. Nevertheless, our study provides comprehensive information about clinical and epidemiological features of colorectal polyps.

***Applications***

Older age is the most important predicator for the prevalence of adenomas, and cancer. Based on the results of this study, the PDR and cancer prevalence reached a peak in the 6th decades of life. Given the increased prevalence of CRC in the sixth decade of life, Regular screening beginning at age 50, is the key to preventing CRC.

***Terminology***

The overall PDR was defined as the proportion of procedures in which at least one polyp was detected over the total number of colonoscopies. ADR was defined as the number of colonoscopies in which one or more adenomas was detected, divided by the total number of colonoscopies performed by the endoscopic.

***Peer-review***

Authors report in this paper the detection rate of colonoscopy for cancer and adenoma in an Iranian population.

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**Table 1 Patients’ characteristics and colonoscopy findings**

|  |  |
| --- | --- |
| **variable** | **All (*n* = 531)** |
| **Sex** | Male, *n* (%)Female, *n* (%) | 236 (44.4)295 (55.6) |
| **Age** | Mean years (SD) | 50.3 ± 15.4 |
| **Age groups** | ≤ 50 > 50 | 250 (47.1)281 (52.9) |
| **Family history** | YesNo | 150 (28.2)381 (71.8) |
| **Indication, *n* (%)** | ScreeningGastrointestinal bleedingConstipationDiarrheaAbdominal painInflammatory bowel diseaseOthers | 120 (22.6)90 (17.0)82 (15.5)74 (14.0)70 (13.3)65 (12.2)29 (5.4) |
| **Patients with at least 1polyps, *n* (%)**  | Neoplastic polypsNon-neoplastic polyps | 68 (54.4)57 (45.6) |
| **Cancer** | *n* (%) | 8 (1.5) |

**Table 2 Histologic type of polyp detection rates and cancer prevalence by gender**

|  |  |  |
| --- | --- | --- |
| **Histologic type of polyps** | **Gender** | **Total** |
| **Male (%)** | **Female (%)** |
| Neoplastic | TubularTubulo-villousVillousSerrated | 18 (53.0)13 (68.4)4 (40.0)3 (60.0) | 16 (47.0)6 (31.6)6 (60.0)2 (40.0) | 34 (100)19 (100)10 (100)5 (100) |
| Total of adenomatous polyps | 38 (55.9) | 30 (44.1) | 68 (100) |
| Non-neoplastic | Hyperplastic | 28 (40.6) | 29 (45.3) | 57 (100) |
| Total of PDR | 66 (52.8) | 59 (47.2) | 125 (100) |
| Cancer | 5 (62.5) | 3 (37.5) | 8 (100) |
| Total | 69 (51.9) | 64 (48.1) | 133(100)  |

PDR: Polyp detection rate.

**Table 3 Histologic type of polyp detection rates and cancer prevalence by age-group**

|  |  |  |
| --- | --- | --- |
| **Histologic type of polyps** | **Age-groups** | **Total** |
| **≤ 50** | **> 50** |  |
| Neoplastic | TubularTubulo-villousVillousSerrated | 6 (17.6) | 28 (82.4) | 34 (100) |
| 7 (36.8) | 12 (63.2) | 19 (100) |
| 3 (30.0) | 7 (70.0) | 10 (100) |
| 3 (60.0) | 2 (40.0) | 5 (100) |
| Total of adenomatous polyps | 19 (28.0) | 49 (72.0) | 68 (100) |
| Non-neoplastic | Hyperplastic | 19 (33.3) | 38 (66.7) | 57 (100) |
| Total of PDR | 38 (30.4) | 87 (69.6) | 125 (100) |
| Cancer | 1 (12.5) | 7 (87.5) | 8 (100) |
| Total | 39 (29.3) | 94 (70.7) | 133 (100) |

PDR: Polyp detection rate.

**Table 4 Histologic type of polyp detection rates and cancer prevalence by family history**

|  |  |  |
| --- | --- | --- |
| **Histologic type of polyps** | **Family history** | **Total** |
| **No (%)** | **Yes (%)** |
| **Neoplastic** | TubularTubulo-villousVillousSerrated | 26 (76.4)13 (68.4)5 (50.0)2 (40.0) | 8 (23.6)6 (31.6)5(50.0)3 (60.0) | 34 (100)19(100)10 (100)5(100) |
| **Total of adenomatous polyps** | 46 (67.6) | 22 (32.4) | 68 (100) |
| **Non-neoplastic** | Hyperplastic | 46 (80.7) | 11 (19.3) | 57 (100) |
| **Total of PDR** | 92 (73.6) | 33 (26.4) | 125 (100) |
| **Cancer** | 0 (0) | 8 (100) | 8 (100) |
| **Total** | 92 (69.2) | 41 (30.8) | 133 (100) |

PDR: Polyp detection rate.

**Table 5 Distribution of polyp detection rates based on histologic type**

|  |  |  |
| --- | --- | --- |
| **Histologic type of polyps** | **Distribution** | **Total** |
| **Proximal colon (%)** | **Distal colon** **(%)** |
| **Neoplastic** | TubularTubulo-villousVillousSerrated | 10 (26.3)9 (40.9) 3 (30.0)3 (37.5) | 28 (73.7) 13 (59.1) 7 (70.0) 5 (62.5) | 38 (100)22 (100)10 (100)8 (100) |
| **Total of adenomatous polyps** | 25 (32.0) | 53 (68.0) | 78 (100) |
| **Non-neoplastic** | Hyperplastic | 19 (31.7) | 41 (68.3) | 60 (100) |
| **Total of PDR** | 44 (31.9) | 94 (68.1)  | 138 (100) |

PDR: Polyp detection rate.

**Table 6 Distribution of polyps and cancer by colonic segments**

|  |  |  |
| --- | --- | --- |
| **Polyps** | **Location** | **Total** |
| **Ascending****colon** | **Transverse****colon** | **Descending****colon** | **Sigmoid** | **Rectum** | **Cecum** | **Hepatic** **Flexure** | **Splenic Flexure** |
| **Tubular** | 3(7.9) | 5(13.2) | 4(10.5) | 7(18.4) | 16(42.1) | 1(2.6) | 1(2.6) | 1(2.6) | 38(100) |
| **Tubulo-villous** | 4(18.2) | 3(13.6) | 2(9.1) | 6(27.3) | 5(22.7) | 2(9.1) | 0(0) | 0(0) | 22(100) |
| **Villous** | 0(0) | 1(10) | 0(0) | 2(20) | 5(50) | 2(20) | 0(0) | 0(0) | 10(100) |
| **Serrated** | 0(0) | 3(37.5) | 1(12.5) | 3(37.5) | 1(12.5) | 0(0) | 0(0) | 0(0) | 8(100) |
| **Hyperplastic** | 7(11.7) | 10(16.7) | 7(11.7) | 16(26.7) | 17(28.3) | 2(3.3) | 0(0.0) | 1(1.7) | 60(100) |
| **Total**  | 14(10.1) | 22(16.0) | 14(10.1) | 34(24.6) | 44(32.0) | 7(5.1) | 1(0.7) | 2(1.4) | 138 (100) |

**Table 7 Size of polyp’s base on histologic type of polyps**

|  |  |  |
| --- | --- | --- |
| **Size** | **histologic type** | **Total** |
| **Hyperplastic** | **Tubular** | **Tubul-villous** | **villous** | **Serrated** |
| **Small** | 11 (44.0) | 0 (0) | 14 (56.0) | 0 (0) | 0 (0) | 25 (100) |
| **Medium** | 14 (46.7) | 0 (0) | 12 (40.0) | 0 (0) | 4 (13.3) | 30 (100) |
| **Large** | 0 (0) | 8 (40.0) | 3 (15.0)  | 9 (45.0) | 0 (0) | 20 (100) |
| **Unknown** | 35 (55.6) | 2 (3.2) | 9 (14.3) | 13 (20.6) | 4 (6.3) | 63 (100)  |
| **Total** | 60 (43.5) | 10 (7.2) | 38 (27.5) | 22 (16.0) | 8 (5.8) | 138 (100) |

Data available for only 75 polyps.

**Table 8 Degree of dysplasia observed in adenomatous polyps base on histologic type of polyps**

|  |  |  |
| --- | --- | --- |
| **Grade** | **histologic type** | **Total** |
| **Tubular** | **Tubul-villous** | **villous** | **Serrated** |
| **Mild** | 21 (51.2) | 11(26.9) | 6 (14.6) | 3 (7.3) | 41 (100) |
| **Moderate** | 11 (57.9) | 3 (15.8) | 3 (15.8) | 2 (10.5) | 19 (100) |
| **Severe** | 6 (33.3) | 8 (44.5) | 1 (5.5) | 3 (16.7) | 18 (100) |
| **Total** | 38 (48.7) | 22 (28.2) | 10 (12.9) | 8 (10.2) | 78 (100) |