

## Characteristics of Colorectal Polyps and Cancer; a Retrospective Review of Colonoscopy Data in Iran

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### ABSTRACT

#### BACKGROUND

Early diagnosis and endoscopic resection of adenomatous polyps is the main approach for screening and prevention of colorectal cancer (CRC). We aimed to assess polyp detection rate (PDR) and to characterize demographic, clinical, and pathological features of colorectal polyps in an Iranian population.

#### METHODS

We retrospectively analyzed the data from 5427 colonoscopies performed during 2007-2012 at Masoud Clinic, the main endoscopy center associated with Sasan Alborz Biomedical Research Center, in Tehran, Iran.

#### RESULTS

Our sample included 2928 (54%) women and 2499 (46%) men, with the mean age of 48.3 years (SD=16.1). The most common reasons for colonoscopy included screening in 25.0%, and gastrointestinal bleeding in 15.2%. Cecal intubation was successful in 86% of patients. The quality of bowel preparation was fair to excellent in 78.1% (n=4235) of colonoscopies. Overall PDR was 42.0% (95% CI: 40.6-43.3). The PDR in men (51.1%, 95% CI: 49.1-53.1) was significantly higher than women (34.2%, 95% CI: 32.4-35.9,  $p<0.001$ ). Polyps were more frequently observed in patients after the 6<sup>th</sup> decade of life ( $F=3.2$ ;  $p=0.004$ ). CRC was detected in 2.9% (73/2499) of men and 1.9% (57/2928) of women ( $p=0.02$ ). The mean age for patients with cancer was significantly higher than that for individuals with polyps, 60.9 (SD=13.4) year vs. 56.9 (SD=13.7) year, respectively ( $p=0.001$ ). Almost 82.8% of the lesions were pre-cancerous with tubular type predominance (62.3%) followed by tubulo-villous (10.3%), villous (6.6%), and serrated (3.6%). Hyperplastic/inflammatory polyps comprised 17.2% of lesions.

#### CONCLUSION

Distal colon was more prone to develop polyps and cancer than proximal colon in our series. These findings provide a great infrastructure for next preventive programs and have implications for colorectal cancer screening at population-level.

#### KEYWORDS

Colon Cancer; Colonoscopy; Colonic Polyps

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#### INTRODUCTION

Colorectal cancer (CRC) is the third most prevalent cancer in men

and the second in women; accounting for 8% (n=608,700) of all cancer deaths worldwide.<sup>1</sup> The highest increase in the incidence of colon cancer are in the Eastern Europe and Asia.<sup>1,2</sup> Recent cancer statistics indicate a decreasing trend in CRC incidence in the United States because of the increase in timely detection and removal of precursor lesions through colonoscopy.<sup>3</sup>

Colorectal cancer is also the third most common cancer in Iranians excluding the skin cancers. It occurs at younger ages with an increasing trend similar in the Asia-Pacific countries.<sup>1,4</sup> These increasing rates may result from the young age-structure and low rates of colon cancer in older people of these countries.<sup>2,5,6</sup>

Colon carcinomas mostly arise from adenomatous polyps and the time span for the transition process is estimated to nearly 10 years on average.<sup>7,8</sup> Given the slow progression of colorectal adenomas into invasive adenocarcinoma,<sup>9</sup> early detection and endoscopic resection of these precancerous lesions, have been claimed to be effective in decreasing both the incidence and mortality rate of CRC.<sup>10-12</sup> There is a report that colonic precancerous lesions (adenomas) with a high prevalence tend to present at younger ages, therefore undergoing screening among asymptomatic adults aged 50 years for adenomas and CRC is strongly recommended.<sup>13</sup>

There is scant knowledge about the prevalence of colorectal polyps and polyp detection rate (PDR) in Iranian adult population. To the best of our knowledge, only few studies are available in the national literature that assessed colorectal polyps,<sup>14-17</sup> but none has explicitly noted the rate of polyp detection and most of them are biased because of their small sample size. Nevertheless, our study provides comprehensive information about clinical and epidemiological features of colorectal polyps, using a relatively large sample of patients undergoing colonoscopy.

The mass screening of colorectal cancer is not yet available in Iran, therefore updating the current knowledge in the scope of colorectal polyps and CRC is essential. Hence, identifying the features of colon polyps (e.g., age of onset, changes in sub-

sites distribution, location, and histology type) have great implications for developing national screening guidelines for CRC.<sup>18</sup> The aims of the current study were to measure PDR, and to evaluate the clinical and histological characteristics of colorectal polyps in an Iranian population.

## MATERIALS AND METHODS

### Study design

We conducted a cross-sectional study and retrospectively assessed the colonoscopy database and pathology reports maintained by Masoud Clinic, a well-known gastrointestinal endoscopy clinic in Tehran, Iran. The Institutional Review Board of Digestive Disease Research Institute, Tehran University of Medical Sciences, approved the study protocol.

### Patients, procedures and measures

We included all patients aged 15 to 90 years, who underwent their first time colonoscopy from June 2007 to March 2013. The patients with a personal history of colon cancer and polyposis were excluded from the study. Twenty two gastroenterologists certified by the Iranian National Board of Gastroenterology and Hepatology performed the procedures using two high-quality colonoscopes (OLYMPUS CV-240, and PENTAX EPK-1000) under conscious sedation.

We collected the data on patients' demographic variables, indications for colonoscopy, quality of bowel preparation, and the rate of successful cecal insertion. For all colorectal lesions, data on clinical and pathological features (i.e., number, size, site, and grade of dysplasia) were obtained.

Pathological features of colorectal lesions were determined using the World Health Organization criteria<sup>19</sup> as follows: hyperplastic, precancerous (serrated, tubular, tubular-villous, and villous), and cancer. The overall polyp detection rate (PDR) was defined as the proportion of procedures in which at least one polyp was detected over the total number of colonoscopies.

The following definitions were used to tabulate

the proportion of polyps detected by different colonic segments. Proximal colon included transverse colon, hepatic flexure, ascending colon and cecum. Distal colon included rectum, sigmoid, descending colon, and splenic flexure.

### Statistical analysis

We reviewed the endoscopic data and pathology records. Patient-level data were used for the estimates of PDR, and summary-level data for presenting pathology features and anatomic site of polyps. Histograms were developed to demonstrate polyp characteristics, i.e., size, counts, and proportion per patient. Categorical data were tested between subgroups using the Chi-square test or the Fisher exact test, where appropriate. Continuous data were presented as means (SD), and 95% confidence interval (CI). The Student *t* test was used for comparisons of means. For statistical significance we considered a *p* value of 0.05 applying 2-tailed statistical tests. All statistical analyses were performed using Stata/MP software, version 11. Plots were created in R, version 2.15.1.

## RESULTS

### Demographics and colonoscopy findings

All patients (*n*=5427) aged 15 to 90 years who underwent their first time colonoscopy from June 2007 to March 2013 were included in this study. Our sample included 2928 (54%) women and 2499 (46%) men, with the mean age of 48.3 years (SD=16.1). The most common reasons for colonoscopy included screening (i.e., asymptomatic adults aged 50 years and older, and first degree relatives of patients with CRC) in 25.0% (*n*=1356), and gastrointestinal bleeding in 15.2% (*n*=824). Other indications for colonoscopy were classified as follows: 7.5% abdominal pain (*n*=405), 8.5% inflammatory bowel disease (*n*=462), 6.3% suspected irritable bowel syndrome (*n*=346). In 37.5% (*n*=2034) of the patients, indications for colonoscopy were not noted (table 1).

Cecal intubation was successful in 86% (*n*=4660) patients. The quality of bowel preparation was ex-

cellent to fair in 78.1% (*n*=4235) of colonoscopies vs. 9.6% (*n*=522) with poor to unsatisfactory preparation. However, bowel cleansing was not mentioned for 12.3% (*n*=670) of examinations. Approximately, 42.0% (*n*=2277) of patients had at least one polyp, and cancer was detected in 2.4% (*n*=130) of patients (table 1).

### Study outcomes

On the basis of colonoscopy reports, the overall PDR was 42.0% (95% CI: 40.6-43.3). Figure 1 depicts the overall distribution of polyps per patient, where the high proportion of patients with 1 or 2 polyps detected, is visible (figure 1). Almost 56.1% (*n*=1277/2277) of patients, who had at least one polyp, were men. The PDR in men (51.1%, 95% CI: 49.1-53.1) was significantly higher than that in women (34.2%, 95% CI: 32.4-35.9, *p*<0.001). The mean age of patients with polyp was 56.9 (SD=13.7) years. Polyps were more frequently observed in patients after the 6th decade of life (*F*=3.2, *p*=0.004, table 2).

Colorectal cancer was detected in 2.9% (73/2499) of men and 1.9% (57/2928) of women, suggesting a significantly higher prevalence among men compared with women (*p*=0.02). Age specific prevalence of CRC is shown in table 2, presenting a peak in the prevalence of CRC after the seventh decade of life (table 2). The mean age of patients with cancer was significantly higher than individuals with polyps, 60.9 (SD=13.4) year versus 56.9 (SD=13.7) year, respectively (*p*=0.001).

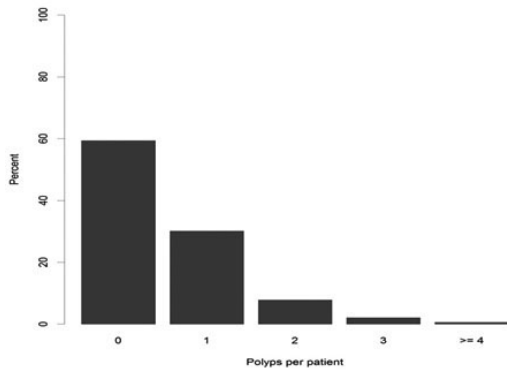
### Characteristics of colonic lesions

A total of 3058 polyps were removed by colonoscopy. Data about the size of polyps were available for 1838 polyps; of these, 30% (*n*=549) were more than 10 mm. Additional information on size distribution are highlighted in figure 2, showing a higher proportion of polyps sized 10-20 mm and ≥ 20 mm in distal colon compared with the proximal colon.

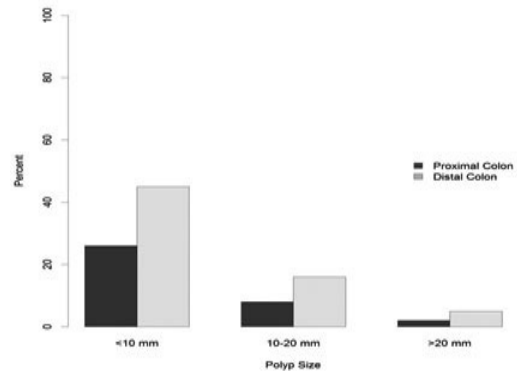
Table 3 shows the distribution of cancer and polyps, in different colonic segments. Overall, polyps were frequently detected in sigmoid (26.8%), rec-

**Table 1: Patients' characteristics and colonoscopy findings**

Variable	All (n=5427)	
Age, mean years (SD)	48.3 (16.1)	
Sex, Male/Female, n(%)	2499 (46.0)/2928 (54.0)	
Indication, n(%)	Screening	1356 (25.0)
	Bleeding	824 (15.2)
	Abdominal pain	405 (7.5)
	Inflammatory bowel disease	462 (8.5)
	Irritable bowel syndrome	346 (6.3)
	Unspecified	2034 (37.5)
Preparation quality, n(%)	Excellent-to-Fair	4235(78.1)
	Poor-to-Unsatisfactory	522 (9.6)
	Unspecified	670 (12.3)
Cecal intubation, n(%)	Yes	4660 (86.0)
	No	767 (14.0)
Patients with at least 1 polyp, n(%)	2277 (42.0)	
Cancer, n(%)	130 (2.4)	



**Fig.1: Overall proportion of colon polyps per patient**



**Fig.2: Size distribution of polyps per colonic segments**

**Table 2: Polyp detection rates and cancer prevalence by age-group (n=5427)**

	<30 yrs. (n=916)	30-39 yrs. (n=890)	40-49 yrs. (n=1006)	50-59 yrs. (n=1227)	60-69 yrs. (n=908)	>=70 yrs. (n=480)	Total (n=5427)
Polyp, no (%)	82 (8.9)	179 (20.1)	322 (32.0)	633 (51.6)	648 (71.4)	413 (86.0)	2277 (42.0)
Cancer, no (%)	6 (0.7)	9 (1.0)	18 (1.8)	29 (2.4)	34 (3.7)	34 (7.1)	130 (2.4)

tum (19.0%), and transverse colon (15.5%). The same colonic distribution was observed for polyps'  $\geq 10$  mm in size. Likewise, cancer was more frequently observed in sigmoid (40.0%), rectum (26.2%), and transverse colon (10.0%), (table 2). The prevalence of polyps in the distal colon was higher than that of the proximal colon (64.5% vs.

35.4%, respectively,  $p < 0.001$ ). Accordingly, most of the cancers were located in the distal colon compared with the proximal colon (72.5% vs. 26.1, respectively,  $p < 0.001$ ).

Colonic distribution of polyps by histology was presented in table 4. Analysis of summary-level data for pathology reports indicated that 82.8% of

**Table 3: Distribution of polyps (count and size\*) and cancer by colonic segments**

	Rectum	Sigmoid	Descending colon	Splenic flexure	Transverse colon	Ascending colon	Hepatic flexure	Cecum
<b>Cancer (n=130)</b>	52(40.0)	34 (26.2)	8 (6.2)	4 (3.1)	13 (10.0)	10 (7.7)	2 (1.5)	7 (5.3)
<b>Polyps* (n=3023)</b>	573(19.0)	811(26.8)	400 (13.2)	55 (1.8)	470 (15.5)	339 (11.2)	163 (5.4)	212(7.0)
<b>Polyps**&lt;10 mm (n=1289)</b>	312 (17)	330(18.0)	154(8.4)	24(1.3)	203 (11.0)	119 (6.5)	56 (3)	91 (4.9)
<b>Polyps &gt;=10 mm (n=549)</b>	119 (6.5)	185(10.0)	65(3.6)	10(0.5)	63(3.5)	61(3.3)	22(1.2)	24(1.3)

\*Location of 35 polyps was not specified; \*\*Size of 1220 polyps was not available.

**Table 4: Colonic\* distribution of polyp count by histologic type, number (%)**

	Hyperplastic/inflammatory	Serrated	Tubular	Tubulo-villous	Villous
<b>Proximal colon (n=1184)</b>	157 (13.3)	26 (2.2)	869 (73.4)	84 (7.1)	48 (4.0)
<b>Distal colon (n=1839)</b>	364 (19.8)	85 (4.6)	1012 (55.0)	228 (12.4)	150 (8.2)

\*Location of 35 polyps was not specified.

lesions were precancerous with tubular type predominance (62.3%) followed by tubulo-villous (10.3%), villous (6.6%), and serrated (3.6%). Hyperplastic/inflammatory polyps comprised 17.2% of lesions. Precancerous lesions (i.e., adenomas and serrated polyps) with higher proportion appeared in distal colon in comparison with the proximal colon (48.2% vs. 33.6 %, respectively, table 4). High grade of dysplasia was reported among 19.5% (n=445) of resected polyps.

## DISCUSSION

We have reported here the features of colorectal neoplasia from a referral gastroenterology clinic using a relatively large database of colonoscopy. The overall estimate for PDR in our patients was 42.0%, which would be correspondent to more than 30% rate of adenoma detection.

Older age is the most important predictor for the prevalence of adenomas, and cancer.<sup>20</sup> In our study, the PDR and cancer prevalence reached a peak in the 6<sup>th</sup> and 8<sup>th</sup> decades of life, respectively. These data are consistent with findings reported by Bafandeh, Mirzaie, and their colleagues.<sup>14-16,21</sup> Studies from the Middle East and the western countries also mentioned significant increase for the risk of CRC, in particular after the age of 50 years.<sup>20,22</sup> Our pa-

tients with cancer were significantly older, 4 years on average, than patients with polyps. This relatively small level of difference in mean age is sensible, even though a difference of 10 years that is compatible with time span required for transformation of a polyp to carcinoma, were explicitly noted by other studies.<sup>15,16</sup> Given the increased prevalence of CRC in the sixth decade of life, the age threshold to start screening for individuals with average risk is 50 years.<sup>23,24</sup>

The risk of developing polyps and cancer in colon is greater in men than in women.<sup>25,26</sup> Our study showed significantly higher rates for both polyps and cancer among men compared with women, which is in line with current evidence that indicates male gender is an important risk factor for polyps and colon cancer.<sup>21,25-27</sup> Moreover, other reports from Iran support gender differences in the prevalence of colon polyps and cancer.<sup>4,14,16,28</sup>

The tubular type was the most common histological feature of adenomas in the present study, in accordance with the results of other reports.<sup>14,16,29</sup> Distal colon was more prone to develop polyps and cancer than proximal colon in our series, comparable with results from the Asian and the Western countries.<sup>13,20,23</sup> However, little evidence exists for the right-ward shift of colonic polyps and can-

cer<sup>17,18,29</sup> across Iranian population. Such an assumption was not further supported by the results of the current study and others.<sup>18,28,30</sup> Nonetheless, because of the significance of adenomas and neoplasms present in proximal colon,<sup>18</sup> complete colonoscopy is recommended in screening guidelines for colon cancer.<sup>23</sup>

Strengths of the current study included use of a relatively large sample of adult patients, and equal number of both genders. The major limitation of our study was the absence of automated interface between our pathology reports and endoscopic database, which prevented us from estimating the detection rate of adenoma, and addressing the predictive factors for them. Finally, our sample included mostly symptomatic patients, in which the estimates may be different from screening studies with asymptomatic individuals.

In summary, data presented here may provide a good infrastructure for the next preventive programs and have clinical implications for colorectal cancer screening through population-level programs. Screening-based studies, however, are required to probe the clinical and epidemiological aspects of colorectal polyps and cancer in Iran.

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#### CONFLICT OF INTEREST

The authors declare no conflict of interest related to this work.

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