



# Detection of Colon Polyps in India—A Large Retrospective Cohort Study (DoCPIr)

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## Abstract

**Objective** Colorectal cancer (CRC) is an emerging public health problem in Asia and India. However, there is scarcity of data on CRC and adenoma. We aimed to study prevalence and characteristics of colonic polyps in a large retrospective cohort.

**Methods** For this retrospective single center study, all patients with age > 18 years undergoing colonoscopy from January 2018 to December 2019 were included. Age, gender, and polyp characteristics were collected from endoscopy and histology database. Patients with incomplete histology reports and anal canal polyps were excluded. Based on histology, polyps were divided into adenocarcinoma, adenoma with advanced pathology (AAP; size > 10 mm, villous morphology or high-grade dysplasia), nonadvanced adenomas (nAAP), and nonadenomas.

**Results** Overall colon polyp prevalence was 10.18% (3551/34893). The mean age (standard deviation [SD]) was 51.51 (14.84) with 75.4% males, of which 128 (3.6%) were adenocarcinoma. A total of 1514 (42.64%) were adenomas; 344 (9.7%) were AAP and 1170 (32.9%) were nAAP. The remaining 1909 (53.8%) were nonadenomas. Colonic adenoma prevalence after excluding adenocarcinoma was 4.35% (1514/34893). Adenocarcinoma (68.8% vs. 31.2%), AAP (70.6% vs. 29.4%), other adenomas (75.4% vs. 24.6%), and nonadenomas (76.7% vs. 23.3%) were significantly higher in male compared with female ( $p < 0.05$ ). Adenomas and adenocarcinomas were more common in left colon and rectum than right colon ( $p < 0.05$ ). The mean age (SD) were significantly lower in nonadenomas than adenocarcinomas, AAP, and other adenomas ( $p < 0.0001$ ; 49.25 [14.84] vs. 55.97 [12.47], 54.78 [16.40], 53.76 [13.71]).

**Conclusions** The prevalence of colonic adenoma in India is 4.35%. Male gender and increased age were associated with increased risk of colonic adenoma and adenocarcinoma, which is more common in left colon and rectum. Prospective multicenter studies are required for evaluation of other risk factors of CRC and colonic adenomas.

## Keywords

- ▶ Colonoscopy
- ▶ Adenoma
- ▶ Adenoma with Advanced Pathology
- ▶ Colorectal Cancer
- ▶ Screening
- ▶ India

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## Introduction

Colorectal carcinoma (CRC) is a common public health problem worldwide. The overall prevalence of CRC in Asian countries and India is reported to be low compared with Western countries.<sup>1</sup> With industrialization and changing socioeconomics in Asia, the burden of CRC is increasing.<sup>2,3</sup> The age-standardized incidence of CRC in India increased from 4.3 in 2008 to 7.2 per 100,000 male population in 2012. It is expected to rise by 60% in males and 37% in females by 2026.<sup>4,5</sup>

Colonic adenomas are recognized as precursor of majority of CRCs through adenoma carcinoma sequence.<sup>6</sup> The prevalence of colonic adenoma in the Western population of age more than 50 years is 20% to 53%.<sup>7</sup> This prevalence is concordant with CRC prevalence in the population. The US National Polyp Study demonstrated that colonoscopy and polypectomy could prevent 76% to 90% of colorectal adenomas.<sup>8</sup>

There is limited data on prevalence of colorectal adenoma from Indian subcontinent. The prevalence of colonic adenoma in India is between 5.4% and 6.7%.<sup>9,10</sup> However, both the studies were single-center and of small sample size. In the current study, we aimed to evaluate the prevalence of colorectal adenoma and histopathological characteristics of colonic polyps in a retrospective cohort.

## Methods

The institutional review board has approved the study. All consecutive adult patients (age > 18 years) who underwent colonoscopy between January 2018 and December 2020 at a tertiary care center were screened for analysis. Patients with at least one colonic polyp were included in the study. The baseline demographic characteristics included age and sex along with colonoscopic and histological characteristics of polyp, which were collected from endoscopic and histopathological database.

Colonoscopies were performed after standard preparation of 2 L of polyethylene glycol by senior gastroenterologist and trainee gastroenterologist under supervision of former. Quality of colonoscopy preparation was assessed by the Boston bowel preparation scale.<sup>11</sup> Patients with poor or inadequate preparation were advised for repeat colonoscopy on subsequent day after repeat preparation. There was no fixed protocol about colon withdrawal time during study period; it was as per discretion and satisfaction of endoscopist.

Patients with anal canal or ileal polyps and colonic polyps, where histological characteristics were incomplete or unavailable, were excluded from analysis. Patients who underwent screening colonoscopy or incomplete colonoscopy without obstructive lesion were also excluded. We excluded patients who underwent screening colonoscopy, those who previously underwent colonoscopic polypectomy or colorectal surgery for CRC, and those with family history of CRC, as these patients are considered as high risk for colorectal adenomas. After histopathological characteristics, colonic polyps were classified into adenocarcinoma, adenomatous polyps or nonadenomatous polyps. The standard

definitions were used to characterize histologically different types of polyps.<sup>12,13</sup> Adenomatous polyps were considered as adenoma with advanced pathology (AAP), if size was more than 10 mm, villous morphology or high-grade dysplasia. If these features were absent, these were considered as non-advanced adenomas (nAAP). Patients with multiple polyps were grouped in adenocarcinoma, AAP, or nAAP, if at least one polyp had features of one the mentioned subgroup.

## Results

A total of 36426 colonoscopy were performed between January 2018 to December 2019, of which 1533 were excluded for following reasons: incomplete colonoscopic examination without obstructive lesions, screening colonoscopy and incomplete histopathological reports. The common indications for colonoscopy were unexplained abdominal pain (2646; 74.5%), anemia (206; 5.8%) per rectal bleeding (873; 24.6%), weight loss (163; 4.6%), and evaluation for liver or lung metastasis (36; 1%).

Overall colon polyp prevalence was 10.18% (3551/34893; 18.08% more than one polyp). The mean age (SD) was 51.51 (14.84) with 75.4% males, of which 128 (3.6%) were adenocarcinoma. A total of 1514 (42.64%) were adenomas; 344 (9.7% of total polyps) were AAP, and 1170 (32.9% of total polyps) were nAAP. The remaining 1909 (53.8%) were nonadenomas. Colonic adenoma prevalence after excluding adenocarcinoma was 4.35% (1514/34893). Adenocarcinoma (68.8% vs. 31.2%), AAP (70.6% vs. 29.4%), nAAP (75.4% vs. 24.6%), and nonadenomas (76.7% vs. 23.3%) were significantly higher in males compared with females ( $p < 0.05$ ). **Table 1** depicts summary of the study population. The mean age (SD) were significantly lower in nonadenomas than adenocarcinomas, AAP, and nAAP ( $p < 0.0001$ ; 48.25 [15.75] vs. 55.97 [12.47], 54.29 [17.59], 53.66 [15.75]). The location of adenocarcinoma was rectum in 37 (28.91%), left colon which included sigmoid and descending colon 48 (37.5%), and right colon which included cecum, ascending and transverse colon 43 (33.59%) patients. There was no significant difference in age of patients with adenocarcinoma location in rectum or left colon (54.60  $\pm$  12.75) and right colon (58.67  $\pm$  11.57;  $p < 0.081$ ).

There were total 1514 (42.64%) adenomas, of them 344 (9.7%) were AAP and 1170 (32.9%) were nAAP. Tubular adenoma was the most common histological type with 1241 (81.97%), followed by tubulovillous 177 (11.69%), and villous 96 (6.3%). Of 1241 tubular adenomas, 71 (5.7%) were either showing high-grade dysplasia or size more than 10 mm. In tubulovillous and villous adenoma, high-grade dysplasia or size more than 10 was seen in 52.38% (143/273) patients. The mean (SD) age of patients with adenoma was 53.80 (14.88) years. The interquartile range was 45 to 64 years. **Table 2** depicts age-wise distribution on colonic polyps. The proportion of nonadenoma polyps were higher than adenomatous polyps in patients of age less than 50 years; between 51 to 60 years, proportion of adenoma and nonadenoma appears comparable, and after 60 years, proportion of adenomatous polyps is more than nonadenomas. In nonadenomatous polyps (1909), hyperplastic ( $n = 925$ ; 48.45%)

**Table 1** Summary of the study population ( $n = 3551$ )

Parameter	Adenocarcinoma ( $n = 128$ )	AAP ( $n = 344$ )	nAAP ( $n = 1,170$ )	Nonadenoma ( $n = 1,909$ )
Age, mean (IQR) years	55.97 (47–65)	54.29 (45.25–66)	53.66 (45–63)	48.92 (39–61)
Sex				
Male, $n$ (%)	88 (68.8)	243 (70.6)	882 (75.4)	1465 (76.7)
Female, $n$ (%)	40 (31.2)	101 (29.4)	288 (24.6)	444 (23.3)
Location				
Rectum, $n$ (%)	37 (28.9)	122 (35.5)	275 (23.5)	716 (37.5)
Left colon, $n$ (%)	48 (37.5)	166 (48.3)	484 (41.4)	708 (37.1)
Right colon, $n$ (%)	43 (33.6)	56 (16.3)	411 (35.1)	485 (25.4)

Abbreviations: AAP, adenoma with advanced pathology; IQR, interquartile range; nAAP, adenoma without advanced pathology.

**Table 2** Age-wise colonic polyp distribution

Age group	Adenocarcinoma ( $n = 128$ )	AAP ( $n = 344$ )	nAAP ( $n = 1,170$ )	Non adenoma ( $n = 1,909$ )	Total ( $n = 3,551$ )
< 40 years	12 (9.4%)	64 (18.6%)	204 (17.5%)	538 (28.2%)	818 (23.1%)
41 to 50 years	30 (23.4%)	58 (16.9%)	232 (19.8%)	409 (21.4%)	729 (20.5%)
51 to 60 Years	34 (26.6%)	77 (22.4%)	335 (28.6%)	474 (24.8%)	920 (25.9%)
> 60 years	52 (40.6%)	145 (42.1%)	399 (34.1%)	488 (25.6%)	1084 (30.5%)

Abbreviations: AAP, adenoma with advanced pathology; nAAP, adenoma without advanced pathology.

and inflammatory ( $n = 820$ ; 42.96%) polyps were the most common. The remaining 164 (8.59%) were hamartomatous, benign epithelial, lipomatous, lymphoid, and carcinoids. Nonadenomatous polyps were more in rectum or left colon compared with right colon (74.59% vs. 24.41%,  $p 0.0001$ ).

## Discussion

Colonic polyps is one of the common findings during colonoscopy. There is scarcity of data from India about colonic polyps detected during colonoscopy. In the current study, colon polyp prevalence is 10.18%, of which 42.64% were adenomas. Overall adenoma prevalence was 4.35%, with mean age (interquartile range [IQR]) of 53.80 (45–64) years. No-adenoma polyps were the most common type of polyps in the present study. Mean age was significantly lower in nonadenoma polyps compared with adenocarcinomas and adenomas. All types of polyps were more common in males and in rectum or left colon.

Majority of CRC arose from adenomatous polyps.<sup>2</sup> Adenoma detection by colonoscopy and removal by polypectomy can prevent CRC.<sup>12,6</sup> The prevalence of adenoma varies with patients' age, sex and family history but is concordant with background rate of CRC in the population.<sup>14</sup> Age is the most important independent determinant of adenoma prevalence.<sup>15,16</sup> The adenoma prevalence in current study was 4.35% with mean age (IQR) of 53.80 (45–64) years. Previous studies from India reported 6.73% adenomas (12.7% overall polyps).<sup>10</sup> In a large series from western India, adenoma prevalence was 5.43% (10.3% overall polyps) with

mean age of 59.5 (14.8) years.<sup>9</sup> The IQR for adenoma in the current series is 45 to 64 years.

In a series of 515 colorectal polyps from western India, 270 (52.4%) were adenoma, 15 (2.9%) were adenocarcinoma, and hyperplastic and inflammatory polyps were 15% each.<sup>9</sup> In our series of 3551 patients, 1514 (42.64%) were adenomas, 1909 (53.8%) were nonadenomas, and 128 (3.6%) adenocarcinoma. Similar to previous studies, we also found tubular adenoma and male preponderance among adenomatous polyps.<sup>9,10</sup> As compared with Western data, the overall prevalence to colonic adenoma appears lower in Indian population; however, within colonic adenoma, proportions of tubular, tubulovillous and villous adenomas appear comparable.<sup>7,17</sup>

The prevalence, incidence, and case fatality of CRC varies in Asian countries.<sup>1</sup> Japan, Korea, China, and Thailand are more affected by CRC compared with India, Indonesia and Vietnam.<sup>18</sup> The five-year prevalence of CRC in Japan, Malaysia, Singapore, China and Korea is higher than in other Asian countries ( $> 46.5/100,000$ )<sup>18</sup> as compared with 8.3/100,000 in India.<sup>1,18</sup> Recent estimates suggest increasing trend of CRC in India by 2026. Age-standardized incidence of CRC in India is expected to increase by 60% in males and 37% in females.<sup>4,5</sup> Considering India's vast population, and with increasing Westernization of lifestyle, CRC may emerge as public health problem. Colonoscopy and polypectomy can be simple and effective tool to prevent CRC, a well-established practice in the West.<sup>6-8</sup>

Apart from being a single-center and retrospective study, the current study has certain other limitations. We have not evaluated other risk factors such as family history, diet and

lifestyle, including smoking, in the current study. There was no fixed protocol about colon withdrawal time during study period; it was as per discretion and satisfaction of endoscopist. We also do not have data on cecal intubation rate, as incomplete colonoscopies were not included in the analysis.

This large sample study highlights the need to develop a screening colonoscopy program. Male gender and increased age were associated with increased risk of colonic adenoma and adenocarcinoma, which is more common in left colon and rectum. As prevalence of CRC is increasing, a prospective, multicenter study is required to define average and high risk population in the Indian population.

#### Author Contributions

Concept and design: Nitin Jagtap, Aniruddha Pratap Singh; Pradev Inavolu; Materials: Nitin Jagtap, Aniruddha Pratap Singh; Data collection and/or processing: Nitin Jagtap, Pradev Inavolu, Shubhankar Godbole, Pranav Ambardekar; Analysis and/or interpretation: Jagtap Nitin, Aniruddha Pratap Singh, Pradev Inavolu; Literature search: Aniruddha Pratap Singh, Nitin Jagtap; Writing manuscript: Nitin Jagtap, Manu Tandan, P Manohar Reddy; Critical review: Mohan Ramchandani, Rajesh Gupta, Sundeep Lakhtakia, Rakesh Kalapala, Anuradha Sekaran, Zaheer Nabi, Radhika Nabi, GV Rao, Reddy DN; Final approval: all authors.

#### Financial Disclosure

There is no financial disclosure.

#### Conflict of Interest

All authors declare no conflict of interest.

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