Original Article

Macroscopic and Histologic Study of Colorectal Polyps: A Cross-sectional Study from Iran

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Abstract

Background: Polyp occurrence in the colon or rectum often raises question and distress for patients and their family. Due to the proven effects of geographic variations and nutritional habits on the incidence of these polyps, the difference in Iranian lifestyle habits, and the cost of screening, conducting an accurate study on aforementioned factors looks essential. In the current study, we aimed to assess various characteristics of this important group of disease. **Materials and Methods:** In this research work, sex, age, location, and macroscopic and pathologic features of 295 specimens from 200 patients, which are sent to the pathology unit of Shohada-e-Tajrish Referral Hospital (2014–2016) as a colonic polyp or reported as a colonic polyp, were investigated. **Results:** Our results are similar to Western countries revealing the polyp prevalence is greater in men and higher in >50 years old, located more in rectum, commonly with sessile appearance and the most pathologic types are adenomatous and hyperplastic polyps. The prevalence of ascending colon polyps rises after 50 years old (P = 0.007). There is a meaningful relationship between age and macroscopic features (P = 0.02). Polyps which are sent from >50-year-old patients and the right side of the colon carry a higher risk for malignancy (P = 0.00). Pedunculated polyps are more prone to be neoplastic (P = 0.00). The prevalence of pedunculated polyps and right-sided polyps, which were sent from the right side, is more in men. Sessile serrated polyps/adenomas were more common in men and were located in the proximal part of the colon (P = 0.005), although unexpectedly two of them were sent from the sigmoid colon. As expected, villous adenomas just were sent from the distal part of the colon and rectum. Two phytobezoars were sent as a colonic polyp. Polyposis syndromes have low incidence; their prevalence was equal in both age (P = 0.124) and sex (P = 1). **Conclusions:** Based on our research work, further studies into the characteristics of polyps in Iranian lifestyle habits would be of great interest.

Keywords: *Colorectal cancer, epidemiology, pathology, polyp*

Introduction

A colon polyp is a clump of proliferated cells that bulge on the epithelial surface of the colon. Most of them tend to be innocuous. However, some colon polyps may change into colon cancer gradually, which can be mortal when found in its advanced stages. Colorectal cancer (CRC) is the third most prevalent diagnosed cancer globally. Early detection of colonic polyps can alleviate CRC morbidity trend through early detection of malignancies and the elimination of polyps.[1] Colorectal polyps are categorized histologically as neoplastic or nonneoplastic. Most of them are tiny and harmless. They can be found through screening or diagnostic procedure conducted for other reasons such as gastrointestinal bleeding.[2]

Neoplastic polyps are accountable for roughly 5-10% of population over age of 40 and these are important predisposing factor for majority of large bowel carcinoma cases. Adenomatous polyps are histologically categorized into three subtypes: tubular adenoma, tubulovillous adenoma, and villous adenoma. Following detection through colonoscopy, complete removal of neoplastic polyps is essentially important, since it would prevent the development of cancer of larger bowel. After the detection and removal of colonic polyps at a primary colonoscopy, some affected individuals are at risk of developing CRC in the future.[3]

According to the recent literature, the occurrence rate of malignant polyps in a series of endoscopically removed polyps is

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estimated roughly 0.2%–11%.[4-7] Fortunately, the removal number of cancerous colorectal polyps is increasing by courtesy of CRC screening programs.[8] With respect to the management and treatment of malignant colorectal polyps, there is still a controversial debate among clinicians. Two existing options are resection or surveillance, which the former is as an exclusive predictor in detrimental result and the latter maintain negligibly <1mm resection margin of polyps.[9]

Non-invasive high grade neoplasia (NHGN), when the cancer is not invaded muscularis mucosa, are treated via polypectomy (not withstanding of their morphology).[10] Malignant polyps (T1) with pedunculated morphology are treated by polypectomy. Surgery is gold standard in malignant polyps (T1) with sessile morphology.[8]

Various factors have been discussed with respect to the prognosis of colorectal polyps such as macroscopic morphology of either polypoid (pedunculated or sessile) or nonpolypoid (flat or ulcerated), type of resection, polypectomy resection margin, stage of differentiation, level of invasion of adenocarcinoma into the polyp, lymphatic invasion, vascular invasion, and favorable and unfavorable histology and the risk of residual disease or recurrent carcinoma.[8,11]

Overall, CRC is mainly regarded as an environmental disease; in this sense, various environmental factors are involved in pathogenesis of this malady.[12] Maladaptive nutritional habits, sedentary lifestyle, and obesity in addition to cigarette smoking and alcohol consumption constitute majority share of environmental factors.[13-15]

In two cross-sectional studies in Iran with large sample number, colorectal polyps are more prevalent in men and in older people (>50 years). The most common histologic type is adenomatous polyp. The colon-specific region with higher rate to develop polyps and the incidence is not the same for both left and right sides. These findings is reported in different studies.[16,17] Furthermore, in Iran, we have observed an outbreak in CRC incidence probably due to transformed Iranian nutritional habit, changes in life style and increasing use of junk foods.[16,17] Due to the proven role of geographic variations and nutritional habits on the incidence of these polyps, the difference in Iranian lifestyle habits, and the debilitating cost of screening, we aimed to conduct a comprehensive study in order to assess the epidemiology and macroscopic and histologic characteristics of colorectal polyps among Iranian population.

Materials and Methods

In the current cross-sectional study, sex, age, place, and macroscopic and pathologic features of 295 specimens from 200 patients, which were sent to the pathology unit of Shohada-e-Tajrish Referral Hospital as a colonic polyp or reported as a colonic polyp during 2014–2016, were assessed.

Inclusion criteria

The inclusion criteria were as follows: existing polyps in colonoscopy or pathologic diagnosis of polyp.

In the current study, sex, age, place, and macroscopic and pathologic characteristics of 295 specimens from 200 patients were assessed retrospectively through referring to their pathologic medical records in Shohada-e-Tajrish Referral Hospital. We divided our samples' age into two groups of above and under 50 years old; age of our samples ranged from 10 to 100 years. Location of obtained samples was categorized as cecum, ascending colon, transverse colon, descending colon, sigmoid, rectum, and unspecified. With respect to the shape of the polyps, we categorized them as sessile, pedunculated, flat, nodule, polypoid mass, and pseudopolyp. Study and patients were assigned on the basis of national/international cancer protocols and approved according to local law and regulations, by the institutional review boards of each participating referral hospital. We followed the last update of the WHO classification of colon polyps. Furthermore, polyposis was assessed according to the age, gender, place, macroscopic and pathologic features, and polyposis syndrome type among 295 samples (200 patients).

Finally, the obtained data were assessed through SPSS-19 (SPSS Inc., IBM, Chicago, USA); study variables were analyzed through Chi-square test, and with respect to the samples <5, we used Fisher's exact test.

In order to maintain the privacy of participants, we used a number of slides on pathologic papers.

Results

Table 1 illustrates the demographic data of polyps according to gender and type of polyp. In all types of polyps, a higher incidence rate was noticed among men than females, except nonneoplastic mesenchymal type. The prevalence of sessile serrated polyps (SSPs) is higher among women.

According to the obtained data, except hamartomatous and mesenchymal types, which were noticed more among patients <50 years old, all other polyps were more prevalent among patients older than 50 years. In comparing two age ranges, we noticed a higher prevalence of inflammatory polyps among >50 patients [Table 2]. The most common histological types of polyps in order are adenomatous, hyperplastic, and inflammatory polyps.

In all locations except cecum, most of the polyps were adenomatous. In the cecum, however, most of the polyps were hyperplastic. In the rectum, most of the polyps were adenomatous, but the percentage of hyperplastic polyps obtained from the rectum was higher in comparison to other locations. All types

Table 1: Demographic data of colorectal polyp types with respect to gender

Polyp types	Gender		Total
	Male	Female	
Neoplastic adenomatous			
Count	92	65	157
Percentage within sex	49.5	59.6	53.2
Percentage of total	31.2	22.0	53.2
Neoplastic sessile serrated polyp			
Count	15	1	16
Percentage within sex	8.1	0.9	5.4
Percentage of total	5.1	0.3	5.4
Nonneoplastic hyperplastic			
Count	33	17	50
Percentage within sex	17.7	15.6	16.9
Percentage of total	11.2	5.8	16.9
Nonneoplastic inflammatory			
Count	17	8	25
Percentage within sex	9.1	7.3	8.5
Percentage of total	5.8	2.7	8.5
Nonneoplastic hamartomatous			
Count	2	0	2
Percentage within sex	1.1	0.0	0.7
Percentage of total	0.7	0.0	0.7
Nonneoplastic mesenchymal			
Count	0	1	1
Percentage within sex	0.0	0.9	0.3
Percentage of total	0.0	0.3	0.3
Miscellaneous polypoid lesions			
Count	15	11	26
Percentage within sex	7.1	10.1	8.9
Percentage of total	5.1	3.8	8.9
Neoplastic-mixed hyperplastic and adenomatous			
Count	2	0	2
Percentage within sex	1.1	0.0	0.7
Percentage of total	0.7	0.0	0.7
Malignant epithelial polyp			
Count	10	6	16
Percentage within sex	5.4	5.5	5.4
Percentage of total	3.4	2.0	5.4
Total			
Count	186	109	295
Percentage within second result	63.1	36.9	100.0
Percentage within sex	100.0	100.0	100.0
Percentage of total	63.1	36.9	100.0

of polyps were obtained more from distal locations such as rectum and sigmoid. Most often, polyps were noticed in the distal part of gastrointestinal (GI) systems, except SSP/adenoma (SSP/A) that was noticed mostly in the proximal part of the colon (except two sigmoid cases). With respect to hamartomatous, inflammatory, mesenchymal, and hyperplastic types, the prevalence rate was higher in the rectum in comparison to the colon. Furthermore, throughout the colon, the prevalence was higher in the distal region of the colon compared to the proximal. Adenomatous polyps were more common in the colon compared to the rectum, and throughout the colon, they were marginally more common in the distal than the proximal part. As aforementioned, in all locations except the cecum, most of the polyps were adenomatous. In the cecum, however, most of the polyps were hyperplastic, although in the cecum, the difference between adenomatous and hyperplastic types is negligible. The prevalence of all types in the rectum and sigmoid colon is more, but the risk of malignancy is higher in the proximal part [Table 3].

Overall, the prevalence of ascending colon polyps rises after 50 years of age (P = 0.007). There is a meaningful relationship between age and macroscopic features (P = 0.02). Polyps of patients older than 50 years that have been sent from the right side of the colon carry a higher risk of malignancy (P = 0.00). Pedunculated polyps are more prone to be neoplastic (P = 0.00). The prevalence of pedunculated polyps and right-sided polyps is more common in men. SSPs were more common in men and were located in the proximal part of the colon (P = 0.005), although unexpectedly two of them were sent from the sigmoid. As expected, villous adenomas just were sent from the distal part of the colon and rectum. Two phytobezoars were sent as a colonic polyp. Polyposis syndromes have low incidence; their prevalence was equal in both age (P = 0.124) and sex (P = 1).

Discussion

According to an alarming trend of CRC in Iran and paradigm shift in nutritional habit and more consumption of junk food as an important environmental risk of CRC,[16,17] we conducted the current study looking at epidemiologic, macroscopic, and histologic characteristics of colorectal polyps among Iranian population.

According to our results, polyps are more prevalent among men older than 50 years; these polyps are located more in the rectum, commonly with sessile appearance, and the most pathologic results are adenomatous and hyperplastic polyps. Furthermore, there is a meaningful relationship between age and macroscopic features (P = 0.02). Polyps obtained from over 50-year-old patients, located in the right side of the colon, maintain a higher proneness to malignancy (P = 0.00). Pedunculated polyps are more prone to be neoplastic (P = 0.00). The occurrence of pedunculated polyps and right-sided polyps is more prevalent in men. SSPs were more common in men and were located in the proximal part of the colon (P = 0.005), although unexpectedly two of them were sent from the sigmoid. As predicted, villous adenomas just were obtained from the distal part of the colon and rectum. Two phytobezoars were sent as a colonic polyp. Polyposis

Table 2: Demographic data of colorectal polyp types with respect to age

Polyp types	Age (50)		Total
	<50	>50	
Neoplastic adenomatous			
Count	21	136	157
Percentage within age 50	37.5	56.9	53.2
Percentage of total	7.1	46.1	53.2
Neoplastic sessile serrated polyp			
Count	1	15	16
Percentage within age 50	1.8	6.3	5.4
Percentage of total	0.3	5.1	5.4
Nonneoplastic hyperplastic			
Count	13	37	50
Percentage within age 50	23.2	15.5	16.9
Percentage of total	4.4	12.5	16.9
Nonneoplastic inflammatory			
Count	12	13	25
Percentage within age 50	21.4	5.4	8.5
Percentage of total	4.1	4.4	8.5
Nonneoplastic hamartomatous			
Count	2	0	2
Percentage within age 50	3.6	0.0	0.7
Percentage of total	0.7	0.0	0.7
Nonneoplastic mesenchymal			
Count	1	0	1
Percentage within age 50	1.8	0.0	0.3
Percentage of total	0.3	0.0	0.3
Miscellaneous polypoid lesions			
Count	4	22	26
Percentage within age 50	7.2	9.2	8.9
Percentage of total	1.3	7.4	8.9
Neoplastic-mixed hyperplastic and adenomatous			
Count	0	2	2
Percentage within second result	0.0	100.0	100.0
Percentage within age 50	0.0	0.8	0.7
Percentage of total	0.0	0.7	0.7
Malignant epithelial polyp			
Count	2	14	16
Percentage within age 50	3.6	5.9	5.4
Percentage of total	0.7	4.7	5.4
Total			
Count	56	239	295
Percentage within second result	19.0	81.0	100.0
Percentage within age 50	100.0	100.0	100.0
Percentage of total	19.0	81.0	100.0

syndromes have low prevalence; their prevalence was equal in the groups under and above years old ($P = 0.124$) and sexes ($P = 1$).

Consistent with the aim of the current studies in Iran and Western countries, Khodadoostan *et al*.[17] and Visovan *et al*.[18] assessed the clinical and pathological characteristics of colorectal polyps, concluding that a meaningful number of adenomas and carcinomas lie proximal to the splenic flexure. However, in our study, the most prevalent locations of adenomas are rectosigmoid and rectum. The pedunculated polyps and polyps were located in the right side of the colon exhibits more prevalence to develop malignant transformation.

In the other study in Iran in 2014, which was performed among 167 patients with the aim of assessing the prevalence and characteristics of colorectal polyps in symptomatic and asymptomatic Iranian patients, the most prevalent locations of adenomas were rectosigmoid and rectum; this result was similar to ours.[19]

In a study conducted by Delavari *et al.,*[16] they evaluated the data obtained from 5427 colonoscopies performed during 2007–2012. Their sample was bigger than our study including 2928 (54%) females and 2499 (46%) males, with a mean age of 48.3 years. The illness of Polyps incidence is more commonly happen after 60 years old predominantly of males gender. As seen in our study, polyps in the large bowel occur in elderly people (>50 years) and are more prevalent in men.[16]

In our study, the most common histologic types of polyp are adenomatous type and hyperplastic type. This finding is similar to the results of Asadzadeh Aghdaei *et al.* that adenomatous polyps were the frequent type.[20]

In 2008, Bafandeh *et al.*[21] looked at clinical predictors of colorectal polyps and carcinoma in a low-prevalence area. Similar to our results, most of the adenomatous polyps were located in the left side. The mean age of patients with cancer was significantly higher than the patients with polyps ($P < 0.0005$), as our findings.[21]

SSP/A was more common in men and was located in the proximal part of the colon in our study. Furthermore, Hai-Long Cao *et al.* in a survey in 2016 about colorectal serrated polyps found the same results.[22]

Conclusions

Overall, in the current study, we aimed to assess various characters of this important group of disease; hopefully, the results may enable us to optimize screening and diagnostic procedures and resolve the problem in its earlier stages. In the current study, we aim to identify epidemiologic differences of colon polyps. This will help us to appreciate more impeccable diagnosis of resected polyps and alleviate the rate of errors and financial burdens.

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Table 3: Demographic data of polyps with respect to location

Polyp types	Cecum	Ascending	Transverse	Descending	Sigmoid	Rectum	Indiscriminate	Total
Neoplastic adenomatous								
Count	4	33	15	20	39	28	18	157
Percentage within second result	2.5	21.0	9.6	12.7	24.8	17.8	11.5	100.0
Percentage within place	25.0	61.1	68.2	66.7	59.1	36.4	60.0	53.2
Percentage of total	1.4	11.2	5.1	6.8	13.2	9.5	6.1	53.2
Neoplastic sessile serrated polyp								
Count	1	9	3	0	2	0	1	16
Percentage within second result	6.3	56.3	18.8	0.0	12.5	0.0	6.3	100.0
Percentage within place	6.3	16.7	13.6	0.0	3.0	0.0	3.3	5.4
Percentage of total	0.3	3.1	1.0	0.0	0.7	0.0	0.3	5.4
Nonneoplastic hyperplastic								
Count	6	5	0	5	7	22	5	50
Percentage within second result	12.0	10.0	0.0	10.0	14.0	44.0	10.0	100.0
Percentage within place	37.5	9.3	0.0	16.7	10.6	28.6	16.7	16.9
Percentage of total	2.0	1.7	0.0	1.7	2.4	7.5	1.7	16.9
Nonneoplastic inflammatory								
Count	3	1	1	3	4	12	1	25
Percentage within second result	12.0	4.0	4.0	12.0	16.0	48.0	4.0	100.0
Percentage within place	18.8	1.9	4.5	10.0	6.1	15.6	3.3	8.5
Percentage of total	1.0	0.3	0.3	1.0	1.4	4.1	0.3	8.5
Nonneoplastic hamartomatous nonneoplastic mesenchymal								
Count	0	0	0	0	0	2	0	2
Percentage within second result	0.0	0.0	0.0	0.0	0.0	100.0	0.0	100.0
Percentage within place	0.0	0.0	0.0	0.0	0.0	2.6	0.0	0.7
Percentage of total	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.7
Nonneoplastic mesenchymal								
Count	0	0	0	0	0	0	1	1
Percentage within second result	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0
Percentage within place	0.0	0.0	0.0	0.0	0.0	0.0	3.3	0.3
Percentage of total	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3
Miscellaneous polypoid lesions								
Count	2	6	2	1	6	6	3	26
Percentage within second result	7.6	23.1	7.6	3.9	23.1	23.1	11.6	100.0
Percentage within place	12.5	11.1	9.1	3.3	9.1	7.8	10.0	8.9
Percentage of total	0.7	2.0	0.7	0.3	2.0	2.0	1.0	8.9
Neoplastic-mixed hyperplastic and adenomatous								
Count	0	0	0	0	0	2	0	2
Percentage within second result	0.0	0.0	0.0	0.0	0.0	100.0	0.0	100.0
Percentage within place	0.0	0.0	0.0	0.0	0.0	2.6	0.0	0.7
Percentage of total	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.7
Malignant epithelial polyp								
Count	0	0	1	1	8	5	1	16
Percentage within second result	0.0	0.0	6.3	6.3	50.0	31.3	6.3	100.0
Percentage within place	0.0	0.0	4.5	3.3	12.1	6.5	3.3	5.4
Percentage of total	0.0	0.0	0.3	0.3	2.7	1.7	0.3	5.4
Total								
Count	16	54	22	30	66	77	30	295
Percentage within second result	5.4	18.3	7.5	10.2	22.4	26.1	10.2	100.0
Percentage within place	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Percentage of total	5.4	18.3	7.5	10.2	22.4	26.1	10.2	100.0

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Conflicts of interest

There are no conflicts of interest.

References

1. Bonnington SN, Rutter MD. Surveillance of colonic polyps: Are we getting it right? World J Gastroenterol 2016;22:1925-34.
2. Colucci PM, Yale SH, Rall CJ. Colorectal polyps. Clin Med Res 2003;1:261-2.
3. Ackroyd FW, Hedberg SE. Colonic polyps. Annu Rev Med 1985;36:619-25.
4. Netzer P, Forster C, Biral R, Ruchti C, Neuweiler J, Stauffer E, *et al.* Risk factor assessment of endoscopically removed malignant colorectal polyps. Gut 1998;43:669-74.
5. Nusko G, Mansmann U, Partzsch U, Altendorf-Hofmann A, Groitl H, Wittekind C, *et al.* Invasive carcinoma in colorectal adenomas: Multivariate analysis of patient and adenoma characteristics. Endoscopy 1997;29:626-31.
6. Soetikno RM, Kaltenbach T, Rouse RV, Park W, Maheshwari A, Sato T, *et al.* Prevalence of nonpolypoid (flat and depressed) colorectal neoplasms in asymptomatic and symptomatic adults. JAMA 2008;299:1027-35.
7. Volk EE, Goldblum JR, Petras RE, Carey WD, Fazio VW. Management and outcome of patients with invasive carcinoma arising in colorectal polyps. Gastroenterology 1995;109:1801-7.
8. Bujanda L, Cosme A, Gil I, Arenas-Mirave JI. Malignant colorectal polyps. World J Gastroenterol 2010;16:3103-11.
9. Naqvi S, Burroughs S, Chave HS, Branagan G. Management of colorectal polyp cancers. Ann R Coll Surg Engl 2012;94:574-8.
10. Hassan C, Zullo A, Winn S, Eramo A, Tomao S, Rossini FP, *et al.* The colorectal malignant polyp: Scoping a dilemma. Dig Liver Dis 2007;39:92-100.
11. The Paris endoscopic classification of superficial neoplastic lesions: Esophagus, stomach, and colon: November 30 to December 1, 2002. Gastrointest Endosc 2003;58:S3-43.
12. Tai YH, Chang WK, Wu HL, Chan MY, Chen HH, Chang KY. The effect of epidural analgesia on cancer progression in patients with stage IV colorectal cancer after primary tumor resection: A retrospective cohort study. PLoS One 2018;13:e0200893.
13. Lee KJ, Inoue M, Otani T, Iwasaki M, Sasazuki S, Tsugane S. Physical activity and risk of colorectal cancer in Japanese men and women: The Japan public health center-based prospective study. Cancer Causes Control 2007;18:199-209.
14. Willett WC. Diet and cancer: An evolving picture. JAMA 2005;293:233-4.
15. Zisman AL, Nickolov A, Brand RE, Gorchow A, Roy HK. Associations between the age at diagnosis and location of colorectal cancer and the use of alcohol and tobacco: Implications for screening. Arch Intern Med 2006;166:629-34.
16. Delavari A, Mardan F, Salimzadeh H, Bishehsari F, Khosravi P, Khanehzad M, *et al.* Characteristics of colorectal polyps and cancer; a retrospective review of colonoscopy data in Iran. Middle East J Dig Dis 2014;6:144-50.
17. Khodadoostan M, Fatemi R, Maserat E, Hooshang A, Alizade M, Molaie M, *et al.* Clinical and pathological characteristics of colorectal polyps in Iranian population. East Afr J Public Health 2010;7:157-9.
18. Visovan II, Tantau M, Ciobanu L, Pascu O, Tantau A. Increasing prevalence of right-sided colonic adenomas in a high-volume endoscopy department in Romania: Implications for colorectal cancer screening. J Gastrointestin Liver Dis 2014;23:147-51.
19. Iravani S, Kashfi SM, Azimzadeh P, Lashkari MH. Prevalence and characteristics of colorectal polyps in symptomatic and asymptomatic Iranian patients undergoing colonoscopy from 2009-2013. Asian Pac J Cancer Prev 2014;15:9933-7.
20. Asadzadeh Aghdaei H, Nazemalhosseini Mojarad E, Ashtari S, Pourhoseingholi MA, Chaleshi V, Anaraki F, *et al.* Polyp detection rate and pathological features in patients undergoing a comprehensive colonoscopy screening. World J Gastrointest Pathophysiol 2017;8:3-10.
21. Bafandeh Y, Khoshbaten M, Eftekhar Sadat AT, Farhang S. Clinical predictors of colorectal polyps and carcinoma in a low prevalence region: Results of a colonoscopy based study. World J Gastroenterol 2008;14:1534-8.
22. Cao HL, Chen X, Du SC, Song WJ, Wang WQ, Xu MQ, *et al.* Detection rate, distribution, clinical and pathological features of colorectal serrated polyps. Chin Med J (Engl) 2016;129:2427-33.