

RESEARCH ARTICLE

High Rate of Advanced Colorectal Polyps in a 10-Year-Long Retrospective Study in Qazvin, Iran

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Abstract

Background: Polyps are common lesions in the gastrointestinal (GI) tract. Colon cancer is mostly a result of progression from polyps. The present study aimed to evaluate demographic, clinical, and histological characteristics of colorectal polyps in Iran, particularly neoplastic and advanced types. **Materials and Methods:** Over a period of 10 years, specimens of all colorectal polyps obtained from colonoscopy were studied. The variables subjected to statistical analysis were age, sex, and the chief clinical complaint of the patients who underwent colonoscopy, their motivation, and the site, size, and histological types of detected polyps. The level of significance was set at p value <0.05. **Results:** Data were obtained from a total of 352 patients. No difference was seen between male and female patients regarding histological types. Only in nine patients was screening the reason for colonoscopy. Almost two-thirds (66.2%) of the polyps were neoplastic. Familial polyposis syndrome and inflammatory bowel disease were seen in 4.3% and 3.0% of the patients with neoplastic polyps, respectively. Sites of polyps were the sigmoid, rectum, and descending colon in 40.1%, 34.5%, and 17% of the cases, respectively. The advanced type made up 58.8% of neoplastic polyps. Only 3.6% of the patients undergoing colonoscopy in the study period had biopsied polyps. **Discussion:** No difference was observed between male and female patients in terms of overall incidence of polyps, histological and anatomical profiles, and mean age distribution. Anatomical and histological profiles agreed with the studies performed in areas with a low risk of colon cancer. The findings show that colonoscopy was not performed when it was necessary. A meaningful increase in the number polyp biopsy cases and a corresponding decrease in polyp size in the last few years of the study can be associated with the presence of more GI specialist clinicians in hospital centers, and this holds out much hope for the further improvement of the situation in the future.

Keywords: Colorectal polyp - histological types - advanced polyps - colonoscopy - colon screening

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Introduction

A polyp is a nodule or mass which protrudes from the mucosal surface toward the lumen. It is a common lesion in the gastrointestinal (GI) tract and has been reported in 25% of the people aged over 60 (Steele et al., 2013) and in 20-40% of those over 50 years of age who underwent colonoscopy for screening purposes in the USA (Shussman and Wexner, 2014). Polyps are of different types and may result from inflammatory or genetic diseases. Although mostly asymptomatic, polyps may cause rectal bleeding and intestinal obstruction.

The most important complication associated with polyps is conversion to cancer, especially affecting the colon. Both neoplastic and non-neoplastic polyps may become cancerous in special conditions such as polyposis (Hornik and Odze, 2009) or large polyp size (Shussman and Wexner, 2014). Colonoscopy and biopsy is the best

way of detecting colon polyps (Fatemi et al., 2010; Shussman and Wexner, 2014). Removal of neoplastic polyps has led to a decrease in the prevalence of colon cancer (Fatemi et al., 2010; Raju et al., 2013). Iran and some other countries in the Middle East are at low risk of colon cancer, but the problem is that diagnosis in this region is with delay (Albasri et al., 2014; Hajmanoochehri et al., 2014).

The paucity of research about the typology of colon polyps in the Iranian adults undergoing colonoscopy triggered the present study. The demographic, clinical, and histological types of polyps will be determined, and possible conflicts with similar studies will be discussed.

Materials and Methods

All specimens of polypectomy or polyp biopsy available in a referral GI center in Qazvin, Iran were

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subjected to a retrospective study. These specimens had been obtained from colonoscopy cases performed over a 10-year-long period spanning March 2001-March 2011. Flat lesions or masses not described as a polyp in colonoscopy reports were excluded from the study. The data were based on the patients and not on the polyps, meaning that if a patient had more than one polyp, only the data related to their most important polyp were considered. For example, if a patient had a neoplastic and a non-neoplastic polyp, only the neoplastic one was included in the analysis. In addition, in patients with histological evidence or a history of inflammatory bowel disease (IBD), the neoplastic polyp was studied only if the patient had no evidence of concurrent dysplasia in other portions of the colon mucosa.

The information regarding each patient's sex, age, and motivation for undergoing colonoscopy, and polyp size, anatomical location, and histological type was obtained from pathology request forms as well as pathology and colonoscopy reports. Each patient was placed in one of three groups based on the reason why they underwent colonoscopy: (1) a family history of positive colon cancer or a positive fecal occult blood test (FOBT) result without any symptom, (2) the presence of a complaint such as rectal bleeding, and (3) follow-up treatment for a known colon disease. Patients with a neoplastic polyp were checked for the presence of histological and historical evidence of the familial polyposis syndrome (FAP) and IBD. A positive family history and/or multiplicity and neoplasticity of polyps were used as criteria for confirming the FAP (Mishra and Hall, 2012).

Polyps were divided up into five histological types: inflammatory, neoplastic, hyperplastic, hamartomatous, and miscellaneous. Serrated polyps were not considered as a separate group, but rather, they were categorized as hyperplastic if dysplasia was not seen and as neoplastic if dysplasia was present (i.e., sessile serrated polyp with dysplasia). Neoplastic polyps were categorized as either advanced or non-advanced according to their histological details (Hornik and Odze, 2009). An advanced neoplastic polyp was considered to be more than 10mm long, to be a villus or a tubulovillus, or to have high-grade dysplasia.

Data were presented as frequency. The data between the mean plus and minus one standard deviation were included in the analysis. The relationships between different categorical and numerical variables were tested at the 0.05 level of significance using Chi-square and independent-samples *t*-tests.

Results

The data were obtained from 352 patients, 199 male (56.5%) and 153 female (43.5%), with a diagnosis of polyps. Thirty-seven patients had more than one biopsied polyp, with 33 of them having histologically similar synchronous polyps. These polyps were commonly adenomatous.

There was no meaningful difference between male and female patients in terms of prevalence of polyp types. As Table 1 shows, inflammatory polyps affected females

more than males; however, as for the other polyp types, males were equal to outnumbered females.

The age range was 11-90 years, with the mean age being 50 (SD=18.2). No difference was observed between males and females regarding mean age.

In 254 patients (72.2%), the motivation for undergoing colonoscopy was the presence of a clinical problem, including abdominal pain in 43 patients (16.9%), rectal bleeding in 124 (48.8%), change in GI habits in 43 (16.9%), general symptoms in 15 (5.9%), and a combination of the said problems in 29 (11.4%). Thirty-one patients (8.8%) had a known colon disease, and only in nine patients (2.6%), colonoscopy was done for screening purposes. In addition, the motivation was unknown in 58 cases (16.5%). FAP and IBD were observed in 10 and 7 patients with neoplastic polyps, respectively.

A total of 233 patients had neoplastic polyps, and the polyps in the rest were of the non-neoplastic type. Inflammatory polyps were seen in 27 patients, including 13 cases of IBD, 5 cases of mucosal prolapse syndrome, and 9 cases with an unknown cause. The hamartomatous type consisted of 33 cases of juvenile polyp and 7 cases of Peutz-Jeghers polyp. The miscellaneous group consisted of one case of lymphoid, lipomatous, fibroid, and vascular type.

There was a meaningful relationship between histological type and anatomical location of polyps ($p=0.004$). The greatest variety in anatomical location was seen with neoplastic polyps, which most commonly affected the sigmoid and the rectum (Table 1).

The relationship between type and size of polyps was also meaningful ($p<0.001$). The greatest variety in polyp size was observed in neoplastic polyps. Indeed, 86.1% of the polyps which were over 20mm long were neoplastic (Table 2).

Another observed meaningful relationship was between polyp size and the year of the study. The polyps detected in recent years were smaller than those of the past ($p<0.001$). No relationship was found between size and anatomical location of polyps.

Polyp size was the most important factor associated with neoplastic advanced polyps, and this factor was present in 49.4% of advanced neoplastic polyps. Of the 233 neoplastic polyps, 137 (58.8%) were advanced. No difference was seen between male and female patients in the prevalence of advanced polyps. Also, there was no difference between patients concerning the cut-off age of forty years. Additionally, advanced polyps equally affected distal and proximal anatomical sites as far as statistical significance was concerned (Table 3).

During the study, 9725 colonoscopy cases were performed but only about 65% of them were complete. Further, 2882 colon biopsies were carried out. More than half (52.3%) of the patients were from the last three years of the period. Only 3.6% of the patients undergoing colonoscopy in the study period had biopsied polyps. Also, 12.2% of the patients referred to the center in this period for colon biopsy had polyps. The male to female (M/F) ratio in colonoscopy was unknown, but it was 1.15:1 in colon biopsy.

Table 1. Variable Distribution According to Histological Types of Colorectal Polyps

		Hyperplastic	Neoplastic	Inflammatory	Hamartomatous	Miscellaneous	Total	P value
Gender	Male	30 15.1%	131 65.8%	12 6.0%	22 11.1%	4 2.0%	199 56.5%	0.246
	Female	18 11.8%	102 66.6%	15 9.8%	18 11.8%	0 0.0%	153 43.5%	
Mean age (year)		51.3	54.8	36.66	29.85	34.75	50	<0.001
Anatomical sites	Rectum	25 52.1%	59 25.3%	12 44.5%	23 57.5%	2 50.0%	121 34.4%	0.004
	Sigmoid	14 29.2%	113 48.5%	6 22.2%	6 15.0%	2 50.0%	141 40.1%	
	Descending colon	6 12.5%	39 16.7%	8 29.6%	7 17.5%	0	60 17.0%	
	Transverse colon	3 6.2%	10 4.3%	1 3.7%	3 7.5%	0	17 4.8%	
	Ascending colon	0	10 4.3%	0	1 2.5%	0	11 3.1%	
	Cecum	0	2 0.9%	0	0	0	2 0.6%	
	Total	48 100%	233 100%	27 100%	40 100%	4 100%	352 100%	

Table 2. Polyp Size and Histological Types of Colorectal Polyps

Histological type	Hyperplastic	Neoplastic	Inflammatory	Hamartomatous	Miscellaneous	Total
size ≤5 (mm)	31 64.6%	79 33.9%	9 33.3%	5 12.5%	1 25.0%	125 35.5%
6-10	2 4.2%	17 7.3%	0	3 7.5%	0	22 62%
11-20	7 14.6%	84 36.1%	5 18.5%	24 60.0%	2 50.0%	122 34.7%
>20	0	31 13.3%	1 3.7%	3 7.5%	1 25.0%	36 10.2%
unknown	8 16.6%	22 9.4%	12 44.5%	5 12.5%	0	47 13.4%
Total	48 100%	233 100%	27 100%	40 100%	4 100%	352 100%

Discussion

The higher incidence of inflammatory polyps in female patients corresponds with the finding of Safarpour et al., 2013 that the most common form of IBD in Iran (i.e., ulcerative colitis) more frequently occurs to female patients.

The present study also found that neoplastic polyps are more prevalent among males. This is consistent with the results reported by other studies carried out in Iran (e.g., Hodadoostan et al., 2010; Eshghi et al., 2011; Zare-Mirzaie et al., 2013) and other countries (e.g., Fenoglio et al., 2010; Pitulak et al., 2012).

As for neoplastic polyps, the M/F ratio was 1.24:1 in this study. However, this ratio was reported to be about 2:1 in countries such as Kuwait (Al-Enezi et al., 2010) and Saudi Arabia (Albasri et al., 2014). Also, Hajmanoochhri et al., 2014 reported an M/F ratio of 1.03:1 for colon adenocarcinoma. This observation (i.e., the M/F ratio for colon polyps being higher than the ratio for colon cancer) was also reported by an American study (Qumseya et al., 2012).

The mean age of our patients was 50 years. This figure is close to the mean age reported by Bafandeh et al., 2005 and Albasri et al., 2014, but it is less than the mean age (60.9 years) of the patients in a study performed by Lowenfels et al., 2011 in the USA. It should be noted that the patients in the latter study were asymptomatic

Table 3. Demographic Details and Anatomical Locations of Polyps in Advanced and Non-Advanced Polyps

		Advanced	Non-advanced	Total	P value
Gender	Male	74 56.5%	57 43.5%	131 56.2%	0.425
	Female	63 61.8%	39 38.2%	102 43.8%	
	Total	137 58.8%	96 41.2%	233 100.0%	
Age class	≤40	29 63.0%	17 37.0%	46 19.7%	0.616
	>40	108 57.8%	79 42.2%	187 80.3%	
	Anatomical site				
Proximal	10 45.5%	12 54.5%	22 9.4%	0.284	
	Distal	127 60.2%	84 39.8%		211 90.6%

adults, and motivation for colonoscopy was colon cancer screening.

In addition, the mean age of patients with inflammatory polyps close to the mean age of IBD patients in Iran (Safarpour et al., 2013). Further, about 20% of our patients had hamartomatous polyps.

A low percentage of Colon colonoscopy operations were motivated by disease screening.

Our study was similar to a study undertaken in Iran (Bafandeh et al., 2008).

At least 10 cases of FAP, 7 cases of IBD, a case of juvenile polyposis, and at least a case of Peutz-Jeghers syndrome were present in our study. Since most studies into colon polyps did not consider these diseases, we did not find similar studies for comparison. FAP and other genetically-induced polyposis syndromes only constitute about 1% of colon cancer, but their early diagnosis is very important, because they are preventable (Mishra and Hall, 2012). Furthermore, because young people make up a significant percentage of patients with colon cancer in Iran (Pourhoseingholi and Zali, 2012; Hajmanoochhri et al., 2014), and these young people probably have a worse survival rate (Elsamany et al., 2014), it is important to study diseases related to colon cancer.

Distribution of different histological types of colon

polyps in this study was close to the data reported in other Iranian studies (Bafandeh et al., 2005; Joukar et al., 2012). We found neoplastic polyps to be the most common type. In a study performed in the Gilan province of Iran (Joukar et al., 2012), more histological types were adenomatous (76.3%), hyperplastic (19.6%), and inflammatory (4.1%). Similarly, in two studies in Thailand (Pitulak et al., 2012) and Saudi Arabia (Albasri et al., 2014) about two-thirds of polyps were neoplastic.

Most of the polyps (including neoplastic) in this study were located in the distal colon and 87% in the left colon. An Iranian study (Eshghi et al., 2011) found that 80.4% of neoplastic polyps resected via colonoscopy or surgery were located in the distal colon. In a study (Albasri et al., 2014) in Saudi Arabia, where there is a low incidence of colon cancer, most neoplastic polyps were located on the left side. By contrast, in the USA (Qumseya et al., 2012) and China (Leng et al., 2010), the frequency of neoplastic polyps appearing in the right side of the colon was equal to (Leng et al., 2010) or more than (Qumseya et al., 2012) that of the polyps seen the left colon.

Shifting of colon cancer to the proximal part of the colon has been reported in many studies performed worldwide (Hornik and Odze, 2009). By considering the relationship between neoplastic polyps and colon cancer, we can expect a similar location shift for the neoplastic polyps of the colon. Fenoglio et al (2010) reported a proximal shift of the neoplastic polyps in the colon without a corresponding proximal shift of colon cancer. Iran is a country with a low risk of colon cancer (Jemal et al., 2011), and most colon cancers are located in the distal colon (Hajmanoochehri et al., 2014). With these facts in mind, the higher incidence of colon polyps in the distal part of the colon was not contrary to our expectations. Nevertheless, the proportion of distal polyps in a study in Iran (Eshghi et al., 2011) that only included complete colonoscopy was only 60.4%. Hence, we must accept that a high rate of missed proximal polyps is probably because complete colonoscopy or biopsy is not performed.

Like some other studies (Eshghi et al., 2011; Joukar et al., 2012), we found that the rectum and the sigmoid were the most common sites where neoplastic polyps appeared. Further, neoplastic polyps appeared in a wider variety of anatomical locations than the other types of polyps did (Bafandeh et al., 2005; Albasri et al., 2014).

The variety we observed for polyp size is similar to the findings of Hornik and Odze, 2009. However, neoplastic polyps were particularly larger than the polyps studied elsewhere. For example, neoplastic polyps with a length of less than 10mm constituted 41.2% of the polyps in this study. Albasri et al., 2014 reported a similar figure (47%) for Saudi Arabia, but Eshghi et al., 2011 and Joukar, (2012) came up with a percentage of 66% for Iran. Also, in a study in the USA (Lowenfels et al., 2011), over 50% of polyps were less than 5mm long, and polyps with a length of more than 15mm made up just under 5% of all the polyps observed. Furthermore, a study in Thailand (Aswakul et al., 2012) showed that over 70% of polyps detected in adults via colonoscopy for screening purposes were less than 5mm long.

Morphological details of neoplastic polyps in our study

were similarly reported by some Iranian studies (Eshghi et al., 2011; Zare-Mirzaie et al., 2013) where 75% of the polyps were of the tubular type. Also, about 14% of the polyps in an Iranian study by Zare-Mirzaie et al., 2013 had high-grade dysplasia.

Like the study by Aswakul et al (2012), the present research found no relationship between advanced adenoma and sex and age. Likewise, Zare-Mirzaie et al (2013) reported no relationship between sex and age on the one hand and high-grade dysplasia on the other. Nevertheless, a higher incidence of high-grade dysplasia has been suggested in men (Albasri et al., 2014) and in the left colon (Zare-Mirzaie et al., 2013; Albasri et al., 2014).

Like a cross-sectional Iranian study (Hodadoostan et al., 2010), we found that about 50% of our neoplastic polyps were advanced. This finding was in contrast with the study by Aswakul et al, 2012 that showed only 2.6% of polyps were advanced.

Polyps were detected in 3.6% of the colonoscopy cases in our study. The figure reported in Bafandeh et al (2008) and Joukar et al (2012) was 11.7% and 14 %, respectively. This large difference can be explained by the fact that our work was retrospective (unlike Bafandeh et al.'s study) and was based on pathology reports and not on colonoscopy reports (as in Joukar et al.'s study). Indeed, we strongly believe that most polyps had not been biopsied.

The rate of missed polyps in some studies was reported to be up to 40% even in the case of polyps with a length of more than 10mm (Steele et al., 2013). If we expect a colon polyp detection rate of 11-14% in Iran (Bafandeh et al., 2008; Joukar et al., 2012), it is still lower than the rate reported in some other countries, over 30% (Aswakul et al., 2012; Spicak et al., 2012).

In the present study, no difference was observed between male and female patients with regard to the overall incidence of colorectal polyps, histological and anatomical profiles, and mean age distribution. We, therefore, can conclude that male and female patients are probably at equal risk of developing colon polyps. This finding is compatible with another study (Hajmanoochehri et al., 2014) carried out in Qazvin that did not show any difference between male and female patients in colon cancer.

The histological profile in this study (i.e., predominance of neoplastic polyps) is consistent with that reported by other studies. Additionally, the anatomical profile of neoplastic polyps, where distal polyps are predominant, agrees with the profile of countries with a low rate of colon cancer.

The current work is limited in several ways. First, we only had the data for biopsied patients. The rate of polyp detection in colonoscopy procedure is probably higher than we determined. However, we believe the difference would not be significant because in our experience if a polyp is reported in colonoscopy, it will usually be sent for pathological evaluation. Furthermore, due to the retrospective nature of the study, we could not obtain more details about the patients' risk factors. Also, we could not determine the rate of polyp conversion to cancer because not all our cases were polypectomy.

The low ratio of colon polyp biopsy to colonoscopy cases, large size of most colonic polyps, and the low rate of asymptomatic individuals undergoing colonoscopy show that colonoscopy was not done when it was necessary. Although FOBT-based screening is recommended as the first-line method in countries with low resources (Norwati et al., 2014), it is actually a low-sensitive route for early diagnosis of colon cancer (Roslan et al., 2012; Shussman and Wexner, 2014).

Willingness to undergo colorectal cancer screening is extremely low in developing countries (Norwati et al., 2012). However, it is advisable that colonoscopy be performed every 10 years to screen all patients of 40 to 50 or over, including those who are asymptomatic (Fatemi et al., 2010; Kaneko et al., 2010; Shussman and Wexner, 2014). Our study showed that failure to adopt this strategy is associated with a high rate of advanced polyps. Performing colonoscopy with the aim of screening becomes particularly important if we know that colon cancer is the third (in women) and fifth (in men) most common type of cancer in Iran (Pourhoseingholi and Zali, 2012) and that this trend is growing (Abdifard et al., 2013).

Finally, a meaningful increase in the number of polyp biopsies and a corresponding decrease in polyp size in the last few years of the present study can be attributed to the employment of more GI specialist physicians in our center, and there is hope that the situation will improve further in the upcoming years.

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References

- Abdifard E, Ghaderi S, Hosseini S, Heidari M (2013). Incidence trends of colorectal cancer in the west of Iran during 2000-2005. *Asian Pac J Cancer Prev*, **14**, 1807-11.
- Albasri A, Yosef H, Hussainy A, Bukhari S, Alhujaily A (2014). Profile of colorectal polyps: a retrospective study from king fahad hospital, madinah, Saudi Arabia. *Asian Pac J Cancer Prev*, **15**, 2669-73.
- Al-Enezi SA, Alsurrayei SA, Ismail AE, et al (2010). Adenomatous colorectal polyps in patients referred for colonoscopy in a regional hospital in Kuwait. *Saudi J Gastroenterol*, **16**, 188-93.
- Aswakul P, Prachayakul V, Lohsiriwat V, Bunyaarunnate T, Kachintorn U (2012). Screening colonoscopy from a large single center of Thailand: something needs to be changed? *Asian Pac J Cancer Prev*, **13**, 1361-4.
- Bafandeh Y, Daghestani D, Esmaili H (2005). Demographic and anatomical survey of colorectal polyps in an Iranian population. *Asian Pac J Cancer Prev*, **6**, 537-40.
- Bafandeh Y, Khoshbaten M, Eftekharsadat AT, Farhang S (2008). Clinical predictors of colorectal polyps and carcinoma in a low prevalence region: results of a colonoscopy based study. *World J Gastroenterol*, **14**, 1534-8.
- Eshghi MJ, Fatemi R, Hashemy A, Aldulaimi D, Khodadoostan M (2011). A retrospective study of patients with colorectal polyps. *Gastroenterol Hepatol Bed Bench*, **4**, 17-22.
- Elsamany SA, Alzahrani AS, Mohamed MM, et al (2014). Clinico-pathological patterns and survival outcome of colorectal cancer in young patients: Western Saudi Arabia experience. *Asian Pac J Cancer Prev*, **15**, 5239-43.
- Fatemi SR, Shivarani S, Malek FN, et al (2010). Colonoscopy screening results in at risk Iranian population. *Asian Pac J Cancer Prev*, **11**, 1801-4.
- Fenoglio L, Castagna E, Comino A, et al (2010). A shift from distal to proximal neoplasia in the colon: a decade of polyps and CRC in Italy. *BMC Gastroenterol*, **10**, 139.
- Hajmanoochehri F, Asefzadeh S, Kazemifar AM, Ebtehaj M (2014). Clinicopathological features of colon adenocarcinoma in Qazvin, Iran: a 16-year study. *Asian Pac J Cancer Prev*, **15**, 951-5.
- Hodadoostan MK, Reza F, Elham M, et al (2010). Clinical and pathology characteristics of colorectal polyps in Iranian population. *Asian Pac J Cancer Prev*, **11**, 557-60.
- Hornik JA, Odze RD (2009). Polyps of the large intestine. In 'surgical pathology of the GI tract, liver, biliary tract and pancreas', Eds Odze RD and Goldblum JR. Saunders, Philadelphia pp 482-510.
- Jemal A, Bray F, Center MM, et al (2011). Global cancer statistics. *CA Cancer J Clin*, **61**, 69-90.
- Joukar F, Majd SK, Fani A, Nazari N, Mansour-Ghanaei F (2012). Colonoscopy outcome in North of Iran (Guilan): 2006-2009. *Int J Clin Exp Med*, **5**, 321-5.
- Kaneko R, Sato Y, An Y, et al (2010). Clinico-epidemiologic study of the metabolic syndrome and lifestyle factors associated with the risk of colon adenoma and adenocarcinoma. *Asian Pac J Cancer Prev*, **11**, 975-83.
- Leng Q, Wu KL, Jin HY, et al (2010). Distribution characteristics of colorectal neoplasm in 4450 patients and implication for colorectal cancer screening. *Zhonghua Wei Chang Wai Ke Za Zhi*, **13**, 822-4.
- Lowenfels AB, Williams JL, Holub JL, Maisonneuve P, Lieberman DA (2011). Determinants of polyp size in patients undergoing screening colonoscopy. *BMC Gastroenterol*, **11**, 101.
- Mishra N, Hall J (2012). Identification of patients at risk for hereditary colorectal cancer. *Clin Colon Rectal Surg*, **25**, 67-82.
- Norwati D, Harny MY, Norhayati MN, Amry AR (2014). Colorectal cancer screening practices of primary care providers: results of a national survey in Malaysia. *Asian Pac J Cancer Prev*, **15**, 2901-4.
- Pourhoseingholi MA, Zali MR (2012). Colorectal cancer screening: time for action in Iran. *World J Gastrointest Oncol*, **4**, 82-3.
- Qumsey B, Coe S, Wallace MB (2012). The effect of polyp location and patient gender on the presence of dysplasia in colonic polyps. *Clin Transl Gastroenterol*, **3**, 20.
- Raju GS, Vadyala V, Slack R, et al (2013). Adenoma detection in patients undergoing a comprehensive colonoscopy. *Cancer Med*, **2**, 391-402.
- Roslan AC, Abdullah T, Arumugam K (2012). Screening for colorectal neoplasias with fecal occult blood tests: false-positive impact of non-dietary restriction. *Asian Pac J Cancer Prev*, **13**, 237-41.
- Safarpour AR, Hosseini SV, Mehrabani D (2013). Epidemiology of inflammatory bowel diseases in Iran and Asia: a mini review. *Iran J Med Sci*, **38**, 140-9.
- Shussman N, Wexner SD (2014). Colorectal polyps and polyposis syndromes. *Gastroenterol Rep*, **2**, 1-15.
- Spicak J, Benes M, Hucl T, et al (2012). A detailed study of colon polyps. *Vnitr Lek*, **58**, 18-23.
- Steele SR, Johnson EK, Champagne B, et al (2013). Endoscopy and polyps-diagnostic and therapeutic advances in management. *World J Gastroenterol*, **19**, 4277-88.

Fatemeh Hajmanoochehri et al

Zare-Mirzaie A, Abolhasani M, Aryamanesh A (2013). Left sided colorectal adenomatous polyps have more risk for high grade dysplasia. *Acta Med Iran*, **51**, 172-7.