

RESEARCH ARTICLE

Profile of Colorectal Polyps: a Retrospective Study from King Fahad Hospital, Madinah, Saudi Arabia

Abdulkader Albasri^{1*}, Hala Yosef¹, Akbar Hussainy¹, Saud Bukhari¹, Ahmed Alhujaily²

Abstract

Aim: To evaluate the predominant colorectal polyps in the Almadinah region of Saudi Arabia. **Materials and Methods:** In this retrospective study, we analyzed pathology reports of colonoscopies performed in King Fahad Hospital, Madinah, Saudi Arabia during the period 2006 to 2013. Data based on patient age, gender, size, site and type of polyps and the degree of dysplasia were analyzed by software SPSS 17 and compared with other published studies from different geographic regions of the world. **Results:** During these years, 224 patients had colonic polyps, of whom 149 (66.5%) were men and 75 (33.5%) were women. The most common types of polyps were adenomatous (166), followed by hyperplastic polyps (24), juvenile (18), inflammatory (13), lipomatous (2) and one patient with Peutz-Jegher polyps. Tubulovillous adenoma was the commonest adenomatous polyp (102), followed by tubular (41) and villous (23) types. The sigmoid colon was the most commonly involved region (36.6%). Dysplasia was significantly associated with female patients who had large size tubulovillous polyps located in the left colon. **Conclusions:** The type and distribution of colorectal polyps in Saudi Arabia is very similar to Western countries. Patient gender, and size, histological type and location of polyps are closely related to dysplastic change in colonic polyps.

Keywords: Colorectal polyps - histological type - dysplasia - factors - Saudi Arabia

Asian Pac J Cancer Prev, 15 (6), 2669-2673

Introduction

Colorectal cancer (CRC) is one of the most commonly diagnosed cancers in the West, after Lung and breast cancers and is responsible for significant mortality and morbidity (Rim et al., 2009; Jemal et al., 2010; American Cancer Society, 2011). Although previously, rest of world had low incidence rates for CRC, is now showing an increasing trend in some regions (Jemal et al., 2010) with some demographic differences from Western patients (Goh et al., 2005). The Kingdom of Saudi Arabia (KSA) is considered a low-incidence area, however one group in their analysis predicted a significant fourfold increase in the burden of CRC in KSA, in the coming decades (Ibrahim et al., 2008) and a more recent report demonstrated continued increase (Mosli and Al-Ahwal, 2012). According to the Saudi Cancer Incidence Report (2012), CRC is second only to breast cancer in the local population of KSA.

The progression of adenoma to adenocarcinoma is a well-accepted concept and basis of screening programs for colorectal carcinomas by colonoscopy (Neri et al., 2010; Aldestein et al., 2011) These screening programs have lead to significant decrease in the incidences of

CRC (Levin et al., 2008). The main focus of CRC control relies on methods to detect and remove adenomas, before they become malignant (Consolo et al., 2010). A number of surveillance guidelines are being followed in the West (Brooks et al., 2008; Health Quality Ontario, 2009). However in a recent excellent mini-review on CRC Screening of Asian Americans, Hwang (2013) has concluded that the individual Asian subgroups were underserved by CRC screening and recommended further studies to focus on each individual Asian subgroup, so that more proficient CRC screening and intervention programs could be developed for each subgroup.

The prevalence of Colorectal polyps/adenomas is high (Heitman et al., 2009) and comparable between the two sexes (Ferlitsch et al., 2011). The prevalence of colorectal polyps varies from one country to another. Among asymptomatic patients, the prevalence is approximately 10% in sigmoidoscopy studies and more than 25% in colonoscopy studies (Giacosa et al., 2004). Further reviewing the literature regarding colorectal polyps, we find a number of recent publications from the West Africa (Lee et al., 2012; Veruttipong et al., 2012; Onyekwere et al., 2013; Patil et al., 2013) and remaining Asia (Bashir

¹Department of Pathology, Taibah University, ²Department of Pathology, King Fahad Hospital, Madinah, Saudi Arabia *For correspondence: abdbasri@hotmail.com

et al., 2012), especially Iran (Geramizadeh and Keshtkar-Jahromi, 2013) however there is a dearth of any research on this pathology in the region except for a recent paper from Kuwait (Al-Enezi et al., 2010).

From the KSA, only one detailed study on colorectal polyps could be retrieved, which was done almost twenty years back at King Khalid University Hospital, Riyadh (Al-Rashed and Al-Amri, 1996). Recently a group from King Abdul Aziz University Hospital (KAAUH), Jeddah; only briefly mentions colorectal polyps, while reporting the profile of all the colonic biopsies in their hospital (Qayyum and Sawan, 2009). In the same year, Bokhary (2009), has studied and reviewed only the Serrated Colonic Polyps in one of the Teaching Hospital of KSA.

Our study is first of its kind in the region of Al-Madinah Al-Munawwarah, KSA, giving detail analysis of the colorectal polyps as diagnosed in the histopathology laboratory of King Fahad Hospital, Al-Madinah Al-Munawwarah.

Materials and Methods

Two hundred and twenty-four patients who underwent polypectomy for colorectal polyps between January 2006 and December 2013 in King Fahad Hospital, Madinah, Saudi Arabia were retrospectively analyzed. All the demographic data such as the age and sex of the patients and information about size of polyps, histological type, location of polyps and grade of dysplasia were collected from pathology reports and analyzed by software program SPSS 17. Association of dysplasia with the patient's age and the site, size, histological type of polyps was assessed using the chi-squared test. The p value <0.05 was considered as statistically significant.

Table 1. Distribution of Different Types of Colorectal Polyps

Polyps	No. (%)	M/F	Average age years
Adenomatous	166 (74.1)	108/58	49.7
Hyperplastic	24 (10.7)	17/7	54.1
Juvenile	18 (8%)	16/2	41.7
Inflammatory	13 (5.8%)	8/5	44.7
Lipomatous	2 (0.9%)	0/2	51
Peutz-jegher	1 (0.5%)	0/1	14
Total	224	149/75	

Table 2. Distribution of Polyps Regarding the Location in the Colon

Location	Adenomatous No. (%)	Hyperplastic No. (%)	Juvenile No. (%)	Inflammatory No. (%)	Lipomatous No. (%)	Peutz-jegher No. (%)
Cecum	2 (1.2%)	-	2 (11.1%)	-	-	-
Ascending colon	23 (13.9%)	-	2 (11.1%)	2 (15.4%)	2 (100%)	-
Hepatic flexure	2 (1.2%)	-	-	-	-	-
Transverse colon	19 (11.4%)	2 (8.3%)	-	2 (15.4%)	-	-
Splenic flexure	3 (1.8%)	2 (8.3%)	-	-	-	-
Descending colon	26 (15.7%)	-	-	2 (15.4%)	-	-
Sigmoid	63 (37.9%)	8 (33.3%)	7 (38.9%)	3 (23.1%)	-	1 (100%)
Rectum	28 (16.9%)	10 (41.8%)	5 (27.8%)	4 (30.8%)	-	-
Anal canal	-	2 (8.3%)	2 (11.1%)	-	-	-
Total	166	24	18	13	2	1

Results

Among 224 studied patients, 149 (66.5%) were men and 75 (33.5%) were women. Average age was 49 years. There were 190 cases (84.8%) with epithelial polyps, composed of 166 adenomatous (74.1%) and 24 hyperplastic polyps (10.7%). Among patients with adenomatous polyps, 102 were tubulovillous adenomatous polyp and the remainders were tubular (41 cases) and villous type of adenomatous polyp (23 cases). There were 34 cases (15.2%) with nonepithelial polyps, composed of 18 juvenile, 13 inflammatory, two cases lipomatous polyps and one patient with Peutz-jegher polyp. The distribution of different types of colorectal polyps is shown in Table 1.

We followed the anatomic distribution of these polyps at the level of the colon: cecum; 4 cases (1.8%), ascending colon; 29 cases (12.9%), hepatic flexure; 2 cases (0.9%), transverse colon; 23 cases (10.3%), splenic flexure; 5 cases (2.2%), descending colon; 28 cases (12.5%), sigmoid; 82 cases (36.6%), rectum; 47 cases (21%) and anal canal; 4 cases (1.8%). The distribution of colorectal polyps regarding the location in the colon is shown in Table 2.

Of all adenomatous polyps only 33 (19.9%) were greater than 20mm in diameter and 55 (33.1%) were 10-20 mm size and 78 (47%) were less than 10 mm in size. The relative frequency of adenoma and relation of histologic type to size is shown in Table 3. In these adenomatous polyps, 59 cases (35.5%) had low grade dysplasia and 107 cases (64.5%) had high grade dysplasia.

Table 4 shows the association of dysplasia with the gender, age, histological type, location and size of polyps. High grade dysplasia is significantly associated with female patients more than male patients (p=0.001). Villous and tubulovillous types are associated with higher rate of dysplasia as compared to tubular type (p<0.001). In addition, large polyps (>1cm) are associated with

Table 3. Relative Frequency of Adenoma-Relation of Histologic Type to Size

Histological type	< 10 mm	10-20 mm	> 20 mm	Total
	No. (%)	No. (%)	No. (%)	No. (%)
Tubulovillous	43 (55.1%)	34 (61.8%)	25 (75.8%)	102 (61.4%)
Tubular	26 (33.3)	11 (20%)	4 (12.1%)	41 (24.7%)
Villous	9 (11.6%)	10 (18.2%)	4 (12.1%)	23 (13.9%)
Total	78 (100%)	55 (100%)	33 (100%)	166 (100%)

Table 4. Dysplasia Association with the Gender, Age, Histological Type, Location and Size of Polyps

	Low Grade dysplasia	High Grade dysplasia	X ²	p value
Sex				
Male	54 (50%)	54 (50%)	10.44	0.001
Female	14 (24.1%)	44 (75.9%)		
Age (years)				
< 20	4 (66.6%)	2 (33.4%)	7.65	0.0538
20-40	8 (40%)	12 (60%)		
41-60	32 (49.2%)	33 (50.8%)		
>60	22 (29.3%)	53 (70.7%)		
Histological type				
Tubular	24 (58.5%)	17 (41.5%)	19.45	< 0.001
Tubulovillous	34 (33.3%)	68 (66.7%)		
Villous	1 (4.3%)	22 (95.7%)		
Location				
Right colon	26 (56.5%)	20 (43.5%)	8.05	0.004
Left colon	39 (32.5%)	81 (67.5%)		
Polyp size				
< 1 cm	51 (65.4%)	27 (34.6%)	27.36	< 0.001
>1 cm	21 (23.8%)	67 (76.2%)		

high grade of dysplasia more than small polyps (<1 cm, $p < 0.001$). High grade dysplasia is seen in polyps located at the left side colon more common than right side colonic polyps ($p = 0.004$).

Discussion

Colorectal cancer (CRC) is quite common in the West (Jemalet al., 2010; American Cancer Society, 2011). Although Asia and KSA are considered as low incidence zones (Goh et al., 2005), however in one of the recent research; the incidence of CRC in the KSA was predicted to increase four folds in the coming decade (Ibrahim et al., 2008). CRC is preventable cancer by changing the dietary habits and through screening programmes. As the colorectal polyps are well known precursors of CRC, their endoscopic removal during bowel screening programs, have significantly decreased the CRC incidence in the West (Levin et al., 2008; Consolo et al., 2010). Through previous and recent researches in screening endoscopy, colorectal polyps have been found to be quite common in the asymptomatic populations of the Western world (Patil et al., 2013) however the literature is quite insufficient in Africa (Veruttipong et al., 2012; Onyekwere et al., 2013) and Asia (Bashir et al., 2012; Geramizadeh and Keshtkar-Jahromi, 2013) especially the Middle East (Al-Enezi et al., 2010).

During the eight years study period (2006-2013), we found 224 colorectal polyps; among them 66.5% were men and 33.5% were women. Our observation of predominant male involvement is consistent with a number of studies from world and region, including KSA (Al-Rashed and Al-Amri, 1996; Zare-Mirzaie et al., 2013).

However one scientist group from Romania have reported slight female preponderance (56.6%) in their study of 795 colonoscopies having 183 cases of colorectal polyps (Munteanu et al., 2009). Similarly another group from Iran, although gave a male predominance figures in the total count of polyps, further qualifies that neoplastic

polyps were more frequent in women; and non-neoplastic polyps were more common in males (Zahir et al., 2010).

In our study, the average age of the colorectal polyp patients was 49 years. In the recent literature of colorectal polyps from the region and Asia, Al-Rashed and Al-Amri (1996) from KSA (Bafandah et al., 2005; 2008) from Iran have reported minimum age results of about 42 years, with wide standard deviations. From Kuwait a very close figure of 45 years has been quoted (Al-Enezi et al., 2010). On the other side of spectrum; mean age has been reported as above 50 years (Wisedopas et al., 2005; Tony et al., 2007), reaching up to maximum of 58 years (Bafandeh et al., 2005). One group from Hong Kong studying advanced polyps and CRC, found the mean age of 69.2 in the advanced polyps (Lam et al., 2007).

Out of 224 polyps, there were 166 adenomatous polyps (74.1%), followed by 24 hyperplastic polyps (10.7%). In all the recently reviewed literature from the region; almost similar figures were reported. From Iran 78.9% adenomatous polyps were reported (Zahir et al., 2010). From Kuwait one group report that out of 530 eligible patients, 10% had 103 adenomatous polyps (Al-Enezi et al., 2010) and finally Al-Rashed and Al-Amri (1996) from KSA in their 2772 colonoscopy study, reported 188 polyps, most of them (89.5%) were tubular and tubulovillous adenomas. In contrast to all these consistent results, only one study from Thailand report higher frequency of Hyperplastic polyps (39%), followed by 36% tubular adenoma (Wisedopas et al., 2005).

Regarding the histological subtypes of 166 adenomatous polyps; in our study, there were 61.4% tubulovillous adenoma, followed by 24.7% tubular adenoma and 13.8% villous adenoma. The literature review from recent publications, however report that tubular adenoma is more common than tubulovillous adenoma. 74% tubular adenoma followed by 20% tubulovillous adenoma have been reported from Kuwait (Al-Enezi et al., 2010); while from Iran, tubulovillous adenoma was reported as infrequent i.e. only 3.3% as compared to 78.9% tubular adenoma (Zahir et al., 2010). Al-Rashed and Al-Amri (1996) from KSA in their 2772 colonoscopy study, reported 188 polyps, they did not separate the two subtypes and reported them together as a total 89.5% were tubular and tubulovillous adenomas.

We followed the anatomic distribution of these polyps at the level of the colon and found 36.6% of polyps in sigmoid colon, followed by 21% in rectum. From Iran also, a group have reported highest number of polyps in Sigmoid colon (27.2%) followed by 21.24% in caecum and ascending colon (Eshghi et al., 2011). Similar were the observations from Romanian scientists, who report 39.85% polyps in sigmoid colon (Munteanu et al., 2009). Finally Al-Rashed and Al-Amri (1996) from KSA also found majority of polyps (82%) in the left side of the colon.

Of all adenomatous polyps only 19.9% were greater than 20mm in diameters and 33.1% were 10-20 mm size and 47% were less than 10 mm in size. From Romania, one group in their study on 795 colonoscopies found 183 cases with polyps: 33.96% were <5 mm, 38.21% were between 5-10 mm, 17.93% were between 11-20 mm and 9.9% of

them were >20 mm (Munteanu et al., 2009). From Iran, a 480 colonoscopy based study, report 56 adenomatous polyps, out of which only 22.5% were more than 10mm (Bafandeh et al., 2008).

In our study, 35.5% adenomatous polyps had low grade dysplasia and 64.5% had high grade dysplasia. High grade dysplasia is significantly associated with female patients more than male patients ($p=0.001$). Villous and tubulovillous types are associated with higher rate of dysplasia as compared to tubular type ($p<0.001$). In addition, large polyps (>1cm) are associated with high grade of dysplasia more than small polyps (<1 cm, $p<0.001$). High grade dysplasia is seen in polyps located at the left side colon more common than right side colonic polyps ($p=0.004$). Similar observation was made by a group in Iran; who studied 240 polyps in 211 cases; and concluded that size of polyp and amount of villous component were strongly associated with high grade dysplasia (Zare-Mirzaie et al., 2013). In a recent study from India (Tony et al., 2007), in which 99 adenomatous polyps were found; 56.56% were less than 1cm, 22.22% were between 1 and 2 cm and 21.21% were greater than 2cm. Dysplasia was severe in large (>2 cm) polyps compared to small (<1 cm) ones ($p<0.001$). A group from Turkey; while studying malignancy risk in small polyps, evaluated 1369 polyps <10 mm in 680 patients. 67.2% of polyps <10 mm were of neoplastic nature, although they did not mention the grading of dysplastic change (Unal et al., 2007).

Summarizing the discussion, our observations are consistent with most of the recent studies from across the globe and region regarding demographic data of colorectal polyps i.e. age, sex, and location of polyps. However tubulo-villous adenoma was the commonest histological subtype in our study; while tubular adenoma has been reported as most common subtype in the recent and remote literature. We found a significant correlation of presence of high grade dysplasia with size of polyps, tubulo-villous/ villous subtypes of adenomata and left sided polyps as reported in previous and present literature; however our observation of significant correlation of high grade dysplasia with female gender had not been reported in the present literature.

We conclude that our study reveal similar type and distribution of colorectal polyps in the region of Al Madinah Al Munawwarah, as that in previous and recent studies from the West and regional countries, with minor differences. We recommend screening programs such as stool occult blood testing and endoscopies for early detection of the colorectal polyps, which are the precursor lesions of CRC, which has been predicted to increase in coming years.

References

- Adelstein BA, Macaskill P, Turner RM, Katelaris PH, Irwig L (2011). The value of age and medical history for predicting colorectal cancer and adenomas in people referred for colonoscopy. *BMC Gastroenterol*, **11**, 97.
- Al-Enezi SA, Alsurayei 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.
- Al-Rashed RS, Al-Amri SM (1996). Colonic polyps: Experience from King Khalid University Hospital. *Ann Saudi Med*, **16**, 180-3.
- American Cancer Society. Colorectal Cancer Facts & Figures 2011-2013. Atlanta: American Cancer Society, 2011 (PDF Accessed - 02/02/2014).
- 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, Eftekhari Sadat 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.
- Bashir S, Nadeem R, Khan NR, Suleman BS, Qureshi GR (2012). Histopathological Analysis of 1000 Colorectal Biopsies in Two Years in Shaikh Zayed Hospital, Lahore. *Pak J Med Health Sci*, **6**, 115-7.
- Bokhary R (2009). Serrated Colonic Polyps in a Teaching Hospital in Saudi Arabia: Prevalence and Review of Classification. *Saudi J Gastroenterol*, **15**, 234-8.
- Brooks DD, Winawer SJ, Rex DK, et al (2008). Colonoscopy surveillance after polypectomy and colorectal cancer resection. *Am Fam Physician*, **77**, 995-1002.
- Cancer Incidence Report. Saudi Arabia 2009 (2012). Kingdom of Saudi Arabia Ministry of Health Saudi Cancer Registry. Issued Dec 2012. (www.scr.org.sa accessed 19/01/2014).
- Consolo P, Luigiano C, Pellicano R, et al (2010). Endoscopic resection as a safe and effective technique for treatment of pedunculated and non-pedunculated benign-appearing colorectal neoplasms measuring 40 mm or more in size. *Minerva Med*, **101**, 311-8.
- Eshghi MJ, Fatemi R, Hashemy A, Aldulaimi D, MahsaKhodadoostan (2011). A retrospective study of patients with colorectal polyps. *Gastroenterology and Hepatology From Bed to Bench*, **4**, 17-22.
- Ferlitsch M, Reinhart K, Pramhas S, et al (2011). Sex-specific prevalence of adenomas, advanced adenomas, and colorectal cancer in individuals undergoing screening colonoscopy. *JAMA*, **306**, 1352-8.
- Geramizadeh B, Keshtkar-Jahromi M (2013). Pathology of colorectal polyps: a study from South of Iran. *Ann Colorectal Res*, **1**, 59-61.
- Giacosa A, Frascio F, Munizzi F (2004). Epidemiology of colorectal polyps. *Tech Coloproctol*, **8**, 243-7.
- Goh KL, Quek KF, Yeo GT, et al (2005). Colorectal cancer in Asians: a demographic and anatomic survey in Malaysian patients undergoing colonoscopy. *Aliment Pharmacol Ther*, **22**, 859-64.
- Health Quality Ontario (2009). Screening methods for early detection of colorectal cancers and polyps: summary of evidence-based analyses. Summary of Evidence-Based Analyses. *Ont Health Technol Assess Ser*, **9**, 1-65.
- Heitman SJ, Ronksley PE, Hilsden RJ, et al (2009). Prevalence of adenomas and colorectal cancer in average risk individuals: a systematic review and meta-analysis. *Clin Gastroenterol Hepatol*, **7**, 1272-8.
- Hwang H (2013). Colorectal cancer screening among Asian Americans. *Asian Pac J Cancer Prev*, **14**, 4025- 32.
- Ibrahim EM, Zeeneldin AA, El-Khodary TR, Al-Gahmi AM, Bin Sadiq BM (2008). Past, present and future of colorectal cancer in the Kingdom of Saudi Arabia. *Saudi J Gastroenterol*, **14**, 178-82.
- Jemal A, Siegel R, Xu J, Ward E (2010). Cancer statistics, 2010. *CA Cancer J Clin*, **60**, 277-300.
- Jemal A, Center MM, DeSantis C, Ward EM (2010). Global

- patterns of cancer incidence and mortality rates and trends. *Cancer Epidemiol Biomarkers Prev*, **19**, 1893-907.
- Lam TJ, Wong BC, Mulder CJ, et al (2007). Increasing prevalence of advanced colonic polyps in young patients undergoing colonoscopy in a referral academic hospital in Hong Kong. *World J Gastroenterol*, **13**, 3873-7.
- Lee B, Holub J, Peters D, Lieberman D (2012). Prevalence of colon polyps detected by colonoscopy screening of asymptomatic Hispanic Patients. *Dig Dis Sci*, **57**, 481-8.
- Levin B, Lieberman DA, McFarland B, et al (2008): Screening and surveillance for the early detection of colorectal cancer and adenomatous polyps, 2008: a joint guideline from the American Cancer Society, the US Multi-Society Task Force on Colorectal Cancer, and the American College of Radiology. *CA Cancer J Clin*, **58**, 130-60.
- Liu HH, Wu MC, Peng Y, Wu MS (2005). Prevalence of advanced colonic polyps in asymptomatic Chinese. *World J Gastroenterol*, **11**, 4731-4.
- Mosli MH, Al-Ahwal MS (2012). Does the increasing trend of colorectal cancer incidence in Jeddah reflect a rise in the Kingdom of Saudi Arabia? *Asian Pac J Cancer Prev*, **13**, 6285-8.
- Munteanu M, Serban C, Savoiu G, Popescu A, Sporea I (2009). Clinical, endoscopic and morphological study of colorectal polyps. *Ann RSCB*, **14**, 1-4.
- Neri E, Faggioni L, Cini L, Bartolozzi C (2010). Colonic polyps: inheritance, susceptibility, risk evaluation, and diagnostic management. *Cancer Manag Res*, **3**, 17-24.
- Onyekwere CA, Odiagah JN, Ogunleye OO, Chibututu C, Lesi OA (2013). Colonoscopy practice in Lagos, Nigeria: a report of an audit. *Diagn Ther Endosc*, **798651**, 1-6.
- Patil R, Khoosal S, Cassidy L, Ona M (2013). Characteristics and risk stratification of colon polyps among asymptomatic hispanic patients undergoing first time screening colonoscopy: a retrospective study. *J Gastroint Dig Syst*, **3**, 1-3.
- Qayyum A, Sawan AS (2009). Profile of colonic biopsies in King Abdul Aziz University Hospital, Jeddah. *J Pak Med Assoc*, **59**, 608-11.
- Rim SH, Seeff L, Ahmed F, King JB, Coughlin SS (2009). Colorectal cancer incidence in the United States, 1999-2004: An Updated Analysis of Data From the National Program of Cancer Registries and the Surveillance, Epidemiology, and End Results Program. *Cancer*, **115**, 1967-76.
- Tony J, Harish K, Ramachandran TM, Sunilkumar K, Thomas V (2007). Profile of colonic polyps in a southern Indian population. *Indian J Gastroenterol*, **26**, 127-9.
- Unal H, Selcuk H, Gokcan H, et al (2007). Malignancy risk of small polyps and related factors. *Dig Dis Sci*, **52**, 2796-99.
- Veruttipong D, Soliman AS, Gilbert SF, et al (2012). Age distribution, polyps and rectal cancer in the Egyptian population-based cancer registry. *World J Gastroenterol*, **18**, 3997-4003.
- Wisodapas N, Thirabanjasak D, Taweevisit M (2005). A retrospective study of colonic polyps in King Chulalongkorn Memorial Hospital. *J Med Assoc Thai*, **88**, 36-41.
- Zahir ST, Binesh F, Hashemian Z, Hakimi A (2010). Demographic survey on colorectal polyps in ShahidSadoughi Hospital, Yazd, Iran. *Rawal Medical Journal*, **35**, 31-3.
- 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.