

A Three-Year Review of the Clinical and Pathologic Profile of Patients with Colonic Polyps in a University Hospital in Metro Manila (2014-2016)



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ABSTRACT

Background The data on the prevalence and distribution of polyps in Asians is limited with conflicting data about the most common type.

Objective To obtain recent data about the histologic types of endoscopically labeled as polyps by colonoscopy and correlate with the clinico-pathologic profile.

Method Retrospective cross-sectional review of histopathologic and endoscopic reports of colonoscopy with biopsy of colonic polyps of patients in the University of Santo Tomas Hospital (January 2014-December 2016).

Results 3910 colonoscopies were performed and a total of 302 patients were retrieved and 500 polyps were resected. The most common indication was hematochezia and hemorrhoids. The colonic polyps were solitary in 36% of the cases. Majority were seen

in 50-69 years old, left sided region (78%), particularly the sigmoid (37%), and sessile (77.3%). The most common type is tubular adenoma (45%) and majority of the adenomatous polyps were seen in the sigmoid. There is significant association between age and presence of an adenomatous polyp where ≥ 70 years old are about 2.5 times more likely to have adenomatous polyp and pedunculated polyps are 2 times more likely to be adenomatous. There is no significant association between presence of an adenomatous polyp and polyp size and gender.

Conclusion The type and distribution of colorectal polyps are similar with others and vigilant approach of the left side should be exercised. Absence of any significant difference between size and adenomatous nature necessitate the need for early identification and removal of colorectal polyp in preventing morbidity and mortality from cancer.

Keywords Colorectal Polyp, Colonoscopy, University of Santo Tomas Hospital, Metro Manila

INVESTIGATORS' AGREEMENT/SIGNATURE

I, Gregory Allan C. Co, MD, the principal investigator of the research paper, will hereby ensure to

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secure all means to protect all confidential information included in the study. I agree to comply with ICH GCP regulations, to secure all means to protect all confidential information included in the study, and to provide financial disclosure statement of the same.

Gregory Allan C. Co, MD
August 1, 2017

INTRODUCTION

BACKGROUND AND OBJECTIVES

The polyp of the colon refers to a visible protuberance into the lumen from the normally flat colonic mucosa. Usually, polyps arise from the mucosal layer of these organs, although some submucosal pathologies may cause mucosal protrusion into the lumen and resemble mucosal polyps. (1). Polyps may be grossly referred by their colonoscopic appearance as either sessile or pedunculated wherein the former is flat and arises directly from the mucosal layer and the latter extend from the mucosa through a fibrovascular stalk due to traction effects on the luminal protrusion. (2) They may likewise be histologically classified as either neoplastic/adenomatous or non-neoplastic which may include hyperplastic, hamartomatous, or an inflammatory type. (3)

Clinically, most polyps are not symptomatic and are found on screening colonoscopies. A recent population-based study in New York in 2013 by Reinhart et al found that at least one polyp was detected in 34.3% of asymptomatic patients undergoing a screening colonoscopy (4). However, the neoplastic/adenomatous polyps are of primary importance because they can harbor a malignant potential, which represents a stage in the development of colorectal cancer. In an autopsy series, the prevalence of colonic polyps is higher and increases with age wherein one-third to one-half of patients found to have an adenomatous polyp also have a synchronous colonic lesion with high grade dysplasia (5).

The prevalence of colorectal adenomatous polyps varies from country to country. In recent studies done in the United States, adenomatous polyps of the colon were found to be the most common and are estimated to be present in 20–53% of screening colonoscopies in people older than 50 years of age (6). In a 2016 case series in the United States by Diamond et. Al, people younger than 50 years of age were found to have an adenoma on a screening colonoscopy in 12% of women and 24% of men

while in women and men older than 80 years, the rates had increased to 27% and 40%, respectively (7). The results are similar in Iran (8), Norway (9) and Canada (10). In a 2015 retrospective study in Albania, it was also noted that the most common types of polyp were the adenomatous kind (72.9%), and majority of polyps were adenomas are located in the rectosigmoid area. (11)

In other countries, different data are being presented. A prospective necropsy study done of the large bowel in 365 cases in Liverpool, England showed that the most common colonic polyp was the hyperplastic variety, of which 86.1% of the total were located in the rectum. (12) This is the same in Denmark in which the number of hyperplastic polyps were more common than adenomatous polyps (13). The data on the prevalence and distribution of polyps in Asians is limited and with conflicting data about the commonest type. In Thailand, the most common type was hyperplastic polyps (14) while it was juvenile polyps in Cameroon (15) and adenomatous polyps in Saudi Arabia (16) and in India (17). In the Philippines, data is limited with regards to the prevalence and type of polyps. A prospective autopsy study was done in 1988 to 1990 and revealed that the prevalence rate for adenomatous polyps was 0.7% and the findings showed a low incidence of colorectal carcinoma. (18) However, according to the Philippine Cancer Society, colorectal cancer is gaining unwanted ground and is now the third leading type of cancer and estimates at least 8,000 new cases of colorectal cancer to occur among Filipinos. (19) It is very important to know the distribution of colorectal polyps in other countries, because it may affect the efficacy of screening modalities and also the prevalence of adenomas that are roughly equivalent to the risk of colorectal malignancies. For this reason, it is essential to gather recent data and to identify these polyps at a sufficiently early stage and remove them and which can stop the development of colorectal cancer and prevent disease and death.

The general objective of this study is to obtain recent data about the common histologic types of endoscopically labeled as polyps/polypoid lesions by colonoscopy and correlate with the clinical and pathologic profile of the patients in the University of Santo Tomas Hospital under a three year period (2014-2016). Other objectives were also to demonstrate the histologic types of colorectal polyps and correlate the demographic, clinical and histologic

parameters of colonic polyps: gender, age, clinical presentation, anatomical location and related colonoscopic findings (single/multiple, size of the polyp, and other findings).

STUDY DESIGN

This is a cross sectional study that is retrospective and a review of records. Included in this study are all in- and out-patients (male and female) who underwent colonoscopy in 2014-2016 in the University of Santo Tomas Hospital and who were endoscopically diagnosed with colonic "polyp/s" or "polypoid lesion/s" only and biopsy was done and sent for histopathological examination together with the findings of the colonoscopy report. The exclusion criteria included all patients who are endoscopically diagnosed with outright malignancy or as "mass" lesion. Likewise, those requests and colonoscopy reports that lack clinical data and information and specimens with requests that have no/unretrievable colonoscopy report are also not included in this study. Specimens that are received from outside the hospital will also not be included in this study.

METHODOLOGY

DATA COLLECTION AND MANAGEMENT

This study was mainly conducted at the Department of Anatomic Pathology at the University of Santo Tomas Hospital. A registry of the histopathology cases from colonoscopies with biopsies for polyps/polypoid lesion in patients that were seen in the years 2014 to 2016 were created and de-identification of the clinical dataset for security and patient confidentiality was done. Cases were defined as all biopsy samples submitted for processing on a single patient for a single date. The registry contained the following information: case identifier, date of the procedure, age and date of birth, patient gender, the site within the colon from which the biopsy specimen was taken, and the free text of the histopathology report. Additional patient-level data was retrieved from the endoscopic report that are routinely attached with the request which included the indication/complaint, other findings and endoscopic description, number and size of the polyp/s, and location. Demographic statistics on colon biopsies by age and gender were summarized using frequencies and percentages. The primary endpoint was the prevalence of colorectal

adenoma vs non-adenomatous polyps in the different age groups. The secondary outcomes included the characteristics of detected lesions (number, multiplicity, location, and size) in both group. The study was carried under the Declaration of Helsinki and subjected under the UST Hospital Institutional Review Board and Ethics Committee for approval prior to commencement of the study. The paper only reviewed histopathologic and endoscopic reports of colonic polyps from the Department of Anatomic Pathology with no interaction with the patients and no intervention were instituted.

DATA ANALYSIS

Data processing and analyses were performed using Stata MP version 14. Continuous variables were presented as mean/SD or median/IQR depending on data distribution while categorical variables were presented as frequency/percentage. Chi square test of association and logistic regression were utilized in order to determine the association of adenomatous polyp and demographic variables. Charts and graphs were created using MS Excel. The results was summarized by odds ratios and associated with 95% confidence interval ($p < 0.05$).

RESULTS

A total of 3910 colonoscopies were performed from January 2014- December 2016. Out of the inclusion and exclusion criteria, a total of 302 patients were retrieved. The highest number was during the year 2015 which amounted to 110 patients or 36.4%. (Figure 1). For the 302 patients, a total of 500 polyps were resected and diagnosed. The mean number of polyp per patient is 1.66 ± 0.96 (Range: 1-6) and a mean polyp size of around 0.46 ± 0.37 (Range: 0.1-3.5). The average age of patients is 59.56 ± 13.20 years (Range: 9-91 years) and majority of colonic polyps were diagnosed in patients aged 50-69 years (58%). (Figure 2). The proportion of patients diagnosed with polyp/s, was found to be comparable by sex with no significant difference between the two genders, even when categorized into the year of diagnosis (Figure 3).

Upon review of the chief complaints of patients in the colonoscopy records, about a quarter (23%) complained about hematochezia prior to colonic polyp diagnosis followed by abdominal pain (19%)

and those underwent surveillance (18%) and screening process (14%). Other complaints (11%) include anemia, melena, positive result in fecal occult blood test (FOBT), change in bowel habits, weight loss, ascites, anal/rectal pain, bloatedness, anal mass, and elevated serum carcinoembryonic antigen (CEA) level. (Figure 4). The majority of patients also had accompanying medical conditions such as hemorrhoids (63%) and diverticular disease (30%) followed by colitis (5%). (Figure 5) Other findings (0.3%-1%) included ulcers, mucosal edema, fissures, prolapse, telangiectasia ileitis, and melanosis coli (data not shown).

Majority of the polyps in the study diagnosed through colonoscopy were found in the sigmoid (37%) followed by the descending colon (18%), ascending colon (14%) and rectum (13%), transverse colon (7%), cecum (5%), rectosigmoid area (5%) and other areas which included (1%). which included the hepatic flexures and ileocecal areas (Figure 6).

In terms of morphology, approximately half of all the colonic polyps seen were described as sessile and minute (51%) followed by sessile only (22%) and pedunculated (9%). (Table 1) Around 3% of the polyps each were described as sessile, flat and diminutive and around 2% as polypoid. Broad based, pedunculated and flat only polyps comprised around 1.5% and those 1% and less were described as such: sessile, broad (0.9%); sessile, wide base (0.4%); pedunculated, minute (0.2%) ; polypoid-like (0.2%); and minute, flat (0.6%).

Majority of the colonic polyps are tubular adenomas (TA) (n=225, 45%) followed by hyperplastic polyps (n=145, 29%). (Figure 7) These are followed by mucosal tags (MT) (n=44, 9%), inflammatory polyps (IP) (n=29, 8%), tubulo-villous adenomas (n=27, 5%), and the other types which include: benign polypoid mucosal tissue with lymphoid nodule (n=10, 2%), gastric heterotopia (n=1, 0.2%), adenocarcinoma (n=1, 0.2%), carcinoid tumor (n=1, 0.2%), retention polyp (n=3, 0.6%), villous adenoma (n=2, 0.4%), traditional serrated adenoma (n=1, 0.2%), adenocarcinoma arising from tubular adenoma/tubule-villous adenoma (n=3, 0.6%), tubular adenoma with high grade dysplasia (n=3, 0.6%), and Peutz-jegher polyp (n=2, 0.4%). Overall, around 52% (95% CI: 48-56%) of the colonic polyps were adenomatous, 47% were non-adenomatous (95% CI: 42-49%) and around 1% turned out to be malignant (95% CI: 0.4-

2%). (Figure 8) When these are stratified by years—case of adenomatous polyps had occurred in 56% in 2014, 50% in 2015 and 50% in 2014. No malignant polyp was observed in the year 2015. (Figure 8)

Review of the adenomatous nature of the polyps according to location was done and revealed that majority of the adenomatous colorectal polyps were in the left-sided area with around one-third (33%) of adenomatous polyps seen in the sigmoid area and descending colon (18%). (Table 2) Also of note is that 18% of the colorectal polyps were adenomatous in nature in the ascending colon. In addition, majority of non-adenomatous polyps were also found in the sigmoid area, followed by the descending colon (18%) and rectum (17%). It was also of note that 3 out of the 5 malignant polyps were located in the sigmoid area.

DISCUSSION

According to Schoen et al (19), the polyp size was estimated inaccurately by the colonoscopists in 20% of cases, with a trend toward overestimation. Likewise, other authors have concluded that colonoscopists may tend to underestimate size lesion (20). Histopathological examination is accepted as the gold standard for definition of polyp size and has been recommended for clinical practice and research purposes alike. (21) In this study, polyp size was defined as that estimated by the pathologist report. Polyps were solitary in 36% of cases and most of the time was multiple (64%). This is comparable to a retrospective study by Lowenfels et al. (22) where approximately two-third of patients who underwent screening colonoscopy has solitary polyps, with the frequency of larger polyps increasing with advancing age. Likewise, retrospective study series of 272 polyps done by Silva et al. (23) in Brazil show over half (51%) were solitary in number. This study showed that there was no significant difference between genders. However, another study by Gurung et. al (22) in a tertiary care hospital Nepal show predominance to male with a 1.8: 1.0 ratio which is also different in comparison to studies in Brazil (23) which showed predominance to females (55%). Most of the chief complaints of patients in the colonoscopy records showed that a quarter (23%) complained about hematochezia prior to colonic polyp diagnosis followed by abdominal pain (19%)

and those who underwent surveillance (18%) and screening process (14%). (Figure 4). A review of the results may be due to the high prevalence of hemorrhoids that were also seen during colonoscopy as seen in Figure 5.

Majority of the colonic polyps that were diagnosed in patients had an age range of 50-69 years old (58%). The results are almost similar to a retrospective review of the distribution of colorectal polyps by Patel et al. (24) of Asian population in a single center and living in the United States where the mean age of the study population of was around 60.8 years (range 50-82). Across all years, majority of polyps were diagnosed in patients between 50-69 years and which was then followed by ≥ 70 years for 2015-2016. A quick literature review (1,23,24) show correlation with development of colorectal polyps with increasing age and show an incidence of adenomatous polyps has been described as 21-28% in patients aged 50-59 years, 41-45% in the 60-69 age group, and 53-58% in patients over the age of 70 years old. A retrospective study on malignant colorectal polyps in 239 patients by Brown et al. (21) likewise shows a median age of 66 years.

Majority of the polyps were found in the sigmoid, followed by descending colon, ascending colon, rectum, and such. This is comparable to a retrospective study in Albania where majority of polyps were adenomas are located in the rectosigmoid area. (11) Likewise, retrospective study in Brazil (23) showed that the most frequent site was the left colon (43.4%), followed by the right colon (20.6%), the transverse colon (17.6%), and the rectum (17.6%).

Overall, there was predominance of the sessile morphology (77.3%) which is also similar to a study done by Silva Marques et al (23) where out of 272 resected polyps, 79.8% were sessile and 20.2 % were pedunculated. Literature review show that this is similar to a retrospective study in Iran (27) where 990 colorectal polyps were analyzed and showed predominance of adenomatous polyps (60.9%) followed by hyperplastic polyps (30.3%) and juvenile retention polyps (8.1%). A histopathological study done in Nepal (26) showed a more widespread distribution but still with majority of the colonic polyps being of the adenomatous type (24%) followed by juvenile retention polyps (22%), and inflammatory polyps (18%) and only a handful cases of hyperplastic polyps (6%). However, an autopsy study (13) done in Denmark showed that the number of hyper-

plastic polyps was more common than adenomatous polyps. These show the spectrum of the types of colonic polyp with regards to the different geographical locations and may influence screening guidelines. In another study (28), which included patients aged 40-89 years, 18.7% of subjects had adenomas, 5% of which were advanced. A prospective necropsy study (12) done in England showed that the most common colonic polyp was the hyperplastic variety, of which 86.1% of the total were located in the rectum.

There was a significant association that was observed between age and presence of an adenomatous polyp ($p=0.002$) in Table 3. Univariate logistic regression analysis revealed that patients that are ≥ 70 years old are about 2.5 times more likely to have adenomatous polyp compared to <50 years (OR: 2.57, 95% CI: 1.44 – 4.58). The odds of having adenomatous polyp is comparable between <50 years and 50-69 years old. Likewise, there is no association observed between sex and presence of adenomatous polyp. This is comparable to a 2016 case series (7) in the United States where people younger than 50 years of age were found to have an adenoma on a screening colonoscopy in 12% of women and 24% of men while in women and men older than 80 years, the rates had increased to 27% and 40%, respectively.

Significant association ($p=0.002$) was observed between the physical characteristic of the polyp to its nature. (Table 4) Further testing using logistic regression revealed that pedunculated polyps are about 2 times more likely to be adenomatous compared to sessile polyps (OR=2.24, $p=0.015$). In addition, other types of polyp are less likely to be adenomatous compared to it being sessile (OR=0.54, $p=0.039$). This may be similar to the results by the retrospective study by Silva et al. (23) wherein results show that polyps that are greater than 1.0 cm tended to be pedunculated and were more likely to exhibit an adenomatous and villous component, and dysplasia as well.

Analysis between the polyp size using an interval size of 0.5 cm and the nature of the polyp was done and showed no significant association between an adenomatous polyp and polyp size. (Table 5) However, a higher proportion of adenomatous polyp (75%) was found to be between 1.6-2.0 cm. This may be an important finding of this study since the absence of any significant difference in histopathol-

ogy features when the size cutoff for polyps was set at 0.5 cm or 1.0 cm, one may conclude that small (<1.0 cm) polyps should not be neglected. This is comparable to a study by Silva et al (24) where the prevalence of advanced histology was 85% in polyps ≥ 1 cm, 27% in polyps 6-9 mm and 10% in polyps ≤ 5 mm in size and the authors concluded that failure to remove small polyps may place patients at risk of progression to advanced lesions and cancer. Likewise, Rex et al (29), in a retrospective study of 5079 patients, had found advanced histology in 0.87% of minute (≤ 5 mm) polyps and 5.3% of small (6-9 mm) polyps while Chaput et al (30) found advanced histology in 4.7% of minute and 35.2% of small polyps.

CONCLUSION

The type and distribution of colorectal polyps in this study are similar in other countries wherein tubular adenoma is still the most common type and majority are diagnosed in the ages of 50-69 years old.

Majority of the colonic polyps are present in the left sided region with the sigmoid being the most common area as well as having the highest occurrence of adenomatous polyps therefore vigilant approach of the left side should be exercised especially during screening colonoscopies. The significant association between the age of the patient and the physical characteristic of the polyp in the presence is also in concordance with other studies except for gender, wherein this study did not show any significant difference. Likewise, no significant association was seen between an adenomatous polyp and the size of the polyp. Therefore, the absence of any significant difference between the two entities would necessitate the need for early identification and removal of colorectal polyps regardless of size in preventing morbidity and mortality from colorectal carcinoma. The presence of other diseases such as hemorrhoids and diverticular disease presenting as hematochezia as indication for colonoscopy may also contribute to early secondary prevention of colorectal carcinoma.

REFERENCES

1. Markowitz, A. J. and Winawer, S. J. (1997), Management of colorectal polyps. *CA: A Cancer Journal for Clinicians*, 47 : (93)–112. doi:10.3322/canjclin.47.2.93
2. Kumar, V. Et. Al. Robbins & Cotran Pathologic Basis of Disease, 9th Edition
3. Noam Shussman, Steven D. Wexner; Colorectal polyps and polyposis syndromes, *Gastroenterology Report*, Volume 2, Issue 1, 1 February 2014, Pages1–15,
4. Reinhart K, Bannert C, Dunkler D, et al. . Prevalence of flat lesions in a large screening population and their role in colonoscopy quality improvement, *Endoscopy* , 2013, vol. 45 (pg. 350-56)
5. O'Brien MJ, Winawer SJ, Zauber AG, et al. . The national polyp study. Patient and polyp characteristics associated with high grade dysplasia in colorectal adenomas, *Gastroenterology* , 1990, vol. 98 (pg. 371-79)
6. Strum, W. B. Colorectal Adenomas. *N. Engl. J. Med.* **374**, 1065–1075 (2016).
7. Diamond SJ, Enestvedt BK, Jiang Z, et al. Adenoma detection rate increases with each decade of life after 50 years of age. *Gastrointest Endosc.* 2011; **74**:135–40.
8. Eide TJ, Stalsberg H (1978) Polyps of the large intestine in Northern Norway. *Cancer* 42: 2839-2848.
9. Vatn MH, Stalsberg H (1982) The prevalence of polyps of the large intestine in Oslo: an autopsy study. *Cancer* 49: 819-825.
10. Khan A, Shrier I, Gordon PH (2002) The changed histologic paradigm of colorectal polyps. *Surg Endosc* 16: 436-440.
11. Gentiana et al., (2015) Histopathological Characteristics of Colon Polyps – A Population-based Study in Tirana, Albania. *J Gastrointest Dig Syst* 2015, 5:2
12. Williams AR, Balasooriya BA, Day DW Polyps and cancer of the large bowel: a necropsy study in Liverpool. *Gut* 1982;**23**:835-842.
13. Johannsen LG, Momsen O, Jacobsen NO (1989) Polyps of the large intestine in Aarhus, Denmark. An autopsy study. *Scand J Gastroenterol* 24: 799-806.
14. Bhargava D. K., Chopra P. Colorectal adenomas in a tropical country. *Diseases of the Colon and Rectum.* 1988;**31**(9):692–693. doi: 10.1007/BF02552585.
15. A. Mbakop, E. C. N. Ndam, J. Pouaha et al., "Anatomopathological aspects of colorectal polyps in Cameroon," *Archives d'Anatomie et de Cytologie Pathologiques*, vol. 39, no. 4, pp. 158–161, 1991.
16. Kumar N., Anand B. S., Malhotra V., Thorat V. K., Misra S. P., Singh S. K., Chaudhary A. Colonoscopic polypectomy. North Indian experience. *The Journal of the Association of Physicians of India.* 1990;**38**(4):272–274. [PubMed]
17. Cajucom, CC., Barrios, GG, Cruz, L., Varin, C. Herrera, L. (1992). Prevalence of colorectal polyps in Filipinos. *Diseases of the Colon & Rectum* July 1992, Volume 35, Issue 7, pp 676–680
18. Philippine Cancer Society Forum: Colorectal cancer among Filipinos. (<http://www.philcancer.org.ph/wp-content/uploads/2014/04/Colon-rectal-cancer.pdf>)
19. Schoen RE, Gerber LD, Margulies C. The pathologic measurement of polyp size is preferable to the endoscopic estimate. *Gastrointest Endosc.* 1997 Dec; **46**(6):492–496.
20. Moug SJ, Vernall N, Saldanha J, McGregor JR, Balsitis M, Diamant RH. Endoscopists' estimation of size should not determine surveillance of colonic polyps. *Colorectal Dis.* 2010;**12**(7):646–650.
21. Hayes SJ. Assessment of colorectal adenomatous polyp size measured during pathological examination highlights the importance of accuracy. *Gastrointest Endosc.* 2009 Sep;**70**(3):540-1.
22. Lowenfels AB, Williams JL, Holub JL, Maisonneuve P, Lieberman DA. Determinants of polyp size in patients undergoing screening colonoscopy. *BMC Gastroenterol.* 2011;**11**:101
23. Silva SM e, Rosa VF, dos Santos ACN, de Almeida RM, de Oliveira PG, de Sousa JB. Influence of Patient Age And Colorectal Polyp Size On Histopathology Findings. *Arquivos Brasileiros de Cirurgia Digestiva : ABCD = Brazilian Archives of Digestive Surgery.* 2014;**27**(2):109-113. doi:10.1590/S0102-67202014000200006.
24. Patel Samarth, Raghav Bansal, Divyangkumar Gandhi, Loveleen Sidhu, Aron Walfish, Ishita Rajnish Distribution and histopathology of colorectal polyps in the Asian population in the United States. DOI: 10.1200/jco.2014.32.3_suppl.436 *Journal of Clinical Oncology* 32, no. 3_suppl (January 2014) 436-436.
25. Brown IS, Bettington ML, Bettington A, et al Adverse histological features in malignant colorectal polyps: a contemporary series of 239 cases *Journal of Clinical Pathology* Published Online First: 30 September 2015. doi: 10.1136/jclinpath-2015-203203
26. Gurung O, Hirachand S, Pradhanang S and Lama S. (2014). A Histopathological Study of Gastrointestinal Polyps in Tertiary Care Hospital, Nepal. *Journal of Institute of Medicine* April 2014. 36:1 64-68
27. Geramizadeh B. et al. Pathology of colorectal Polyps: A study from South Iran. *Annals of Colorectal Research.* 2013; **1**(2): 59-61.
28. Tsai FC, Strum WB. Prevalence of advanced adenomas in small and diminutive colon polyps using direct measurement of size. *Dig Dis Sci.* 2011 Aug;**56**(8):2384–2388.
29. Rex DK, Overhiser AJ, Chen SC, Cummings OW, Ulbright TM. Estimation of impact of American College of Radiology recommendations on CT colonography reporting for resection of high-risk adenoma findings. *Am J Gastroenterol.* 2009 Jan;**104**(1):149–153
30. Chaput U, Alberto SF, Terris B, Beuvon F, Audureau E, Coriat R, et al. Risk factors for advanced adenomas amongst small and diminutive colorectal polyps: a prospective monocenter study. *Dig Liver Dis.* 2011 Aug;**43**(8):609–612. [PubMed]



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APPENDIX 1: FIGURES 1-8

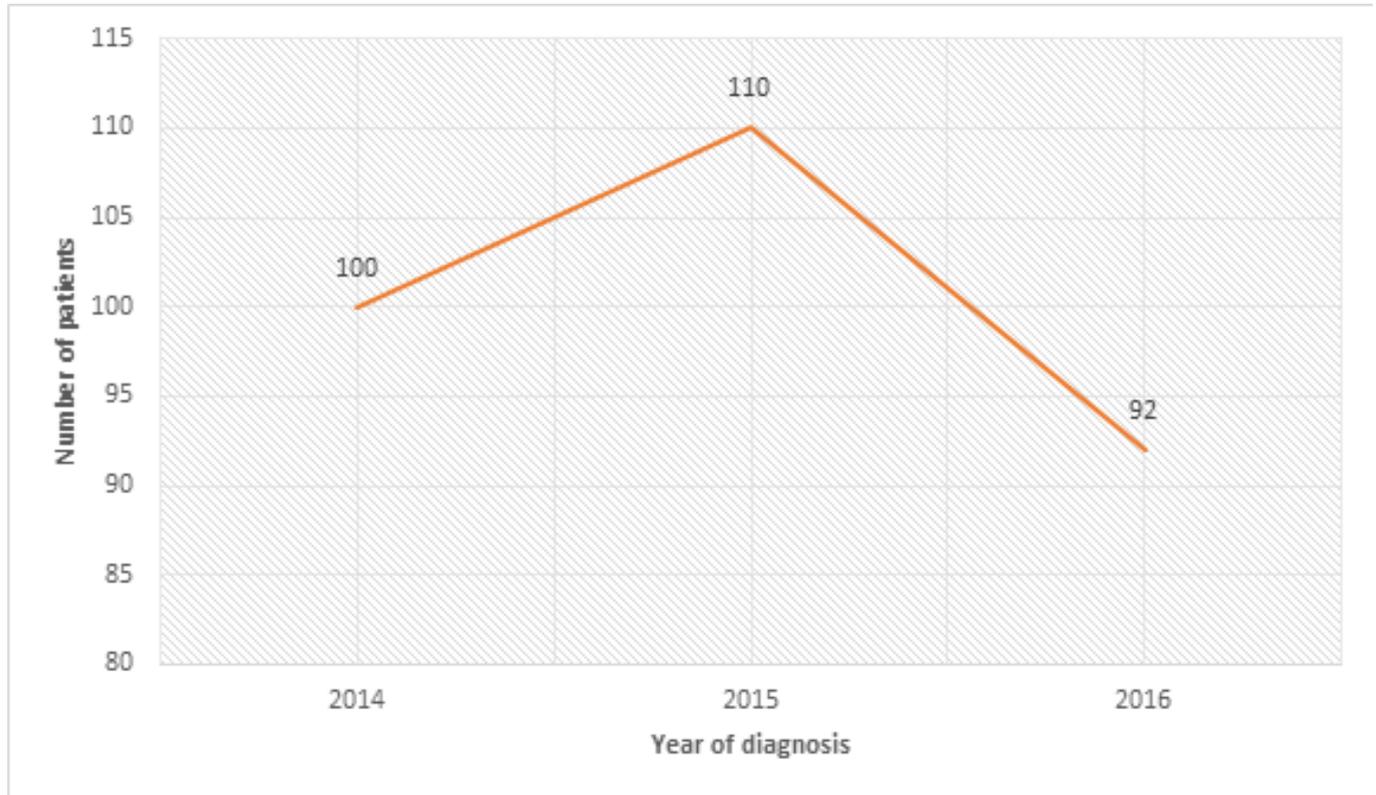


Figure 1. Number of patients diagnosed with polyp by year (n=302)



Figure 2. Age distribution of patients by year of polyp diagnosis (n=302)

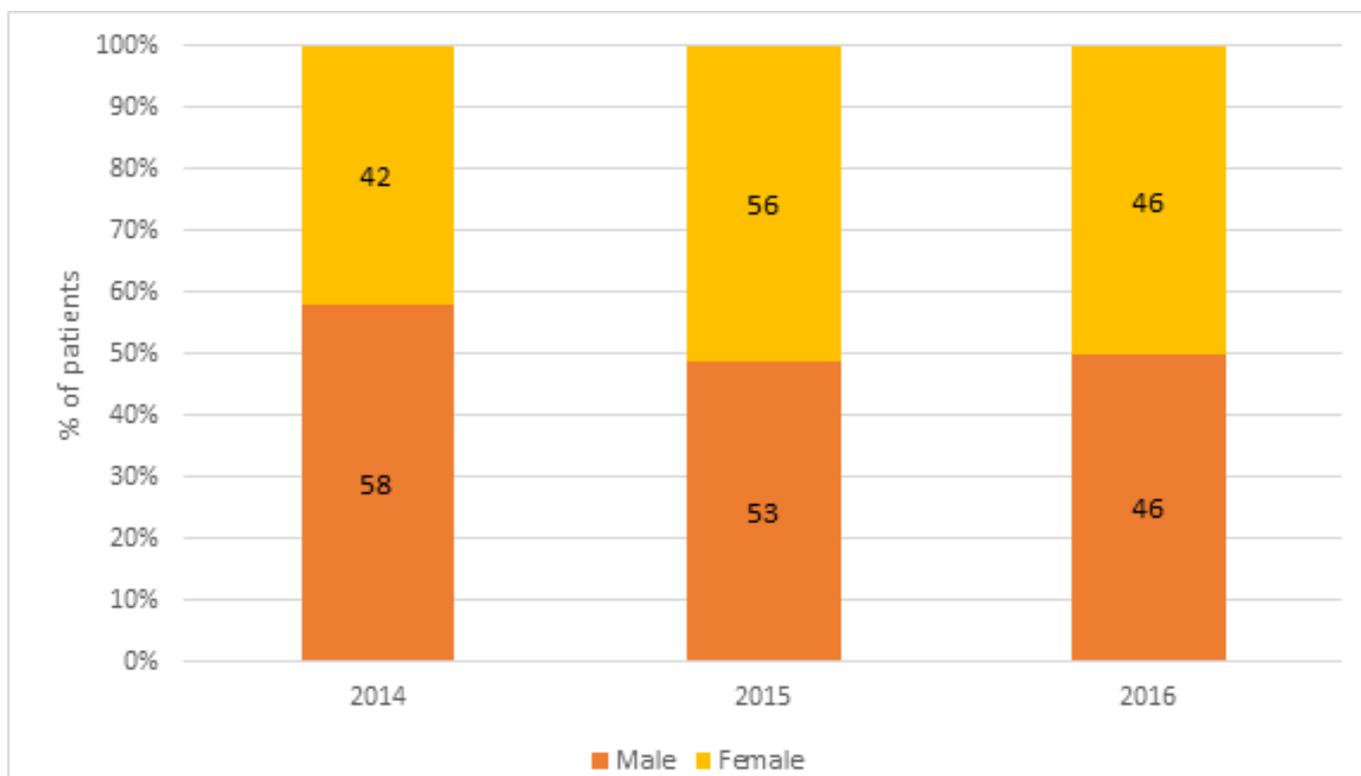


Figure 3. Sex distribution of patients by year of polyp diagnosis (n=301)

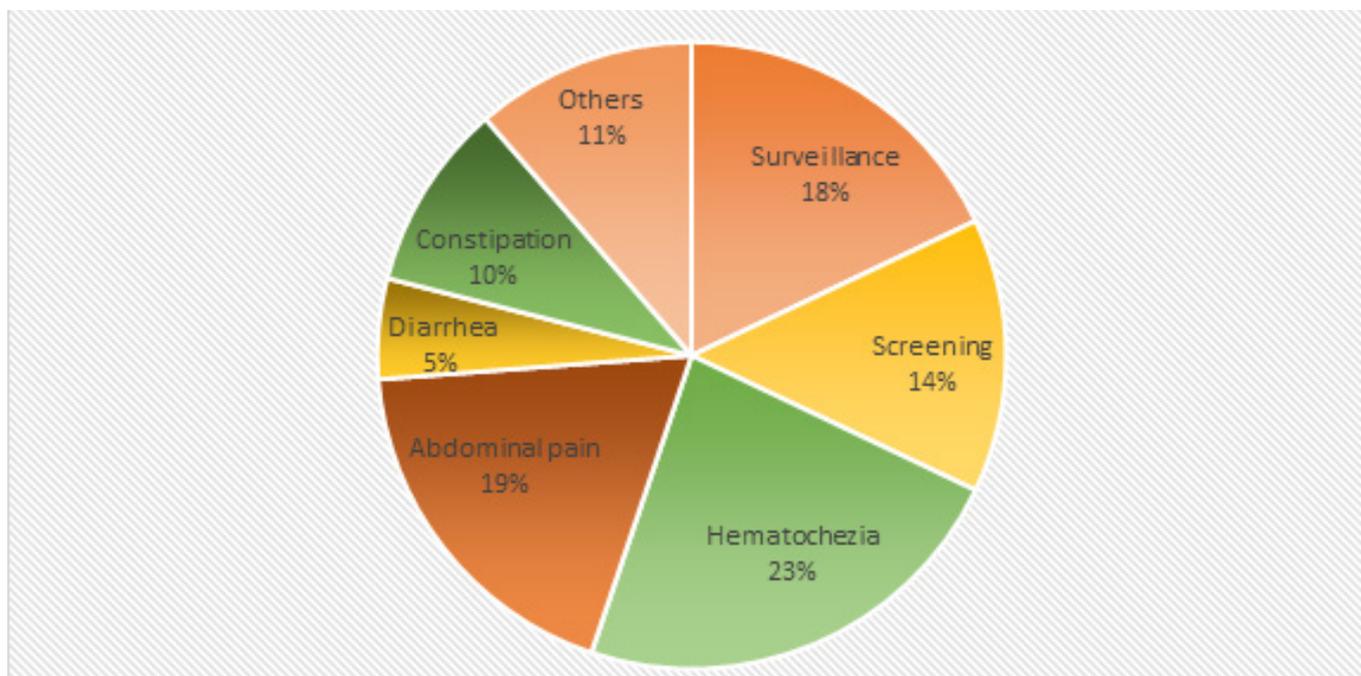


Figure 4. Patient complaints prior to polyp diagnosis (n=301)

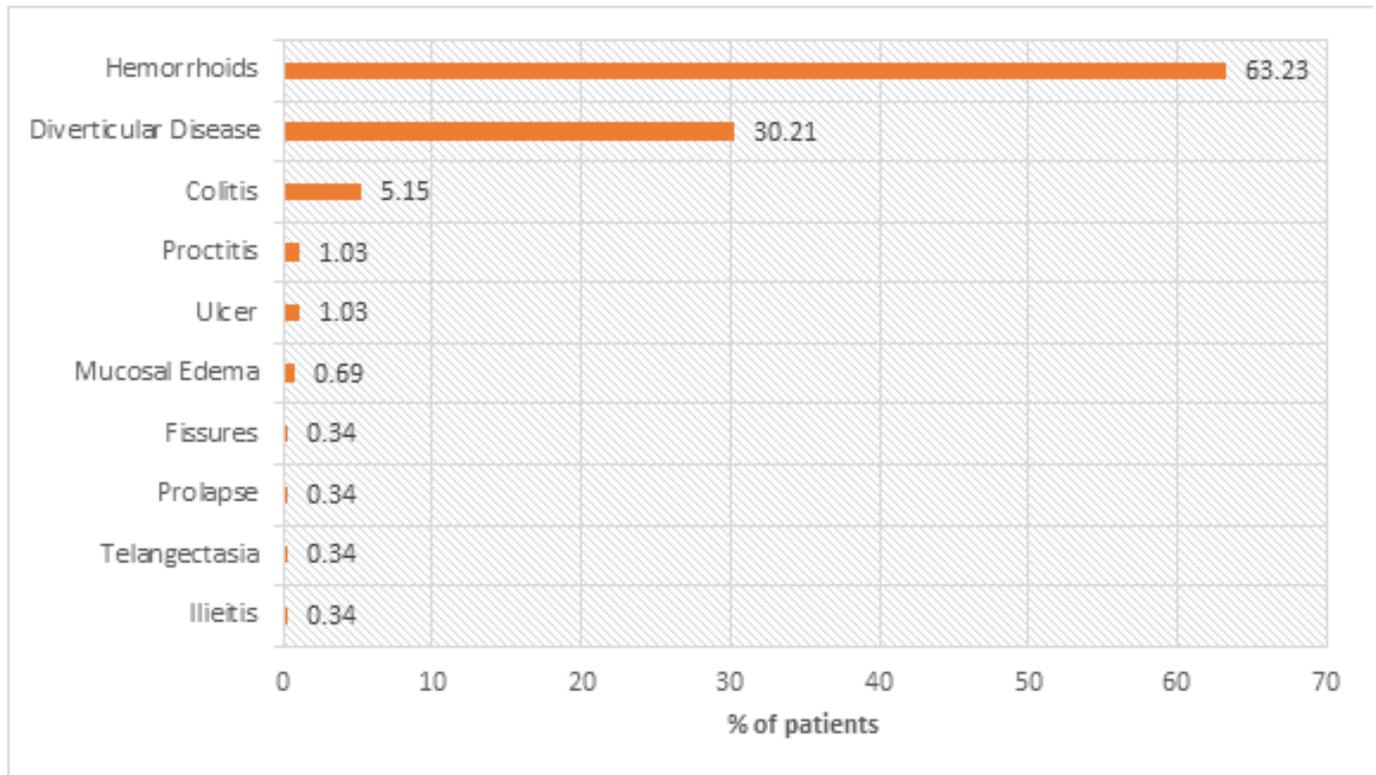


Figure 5. Other Findings from Colonoscopy

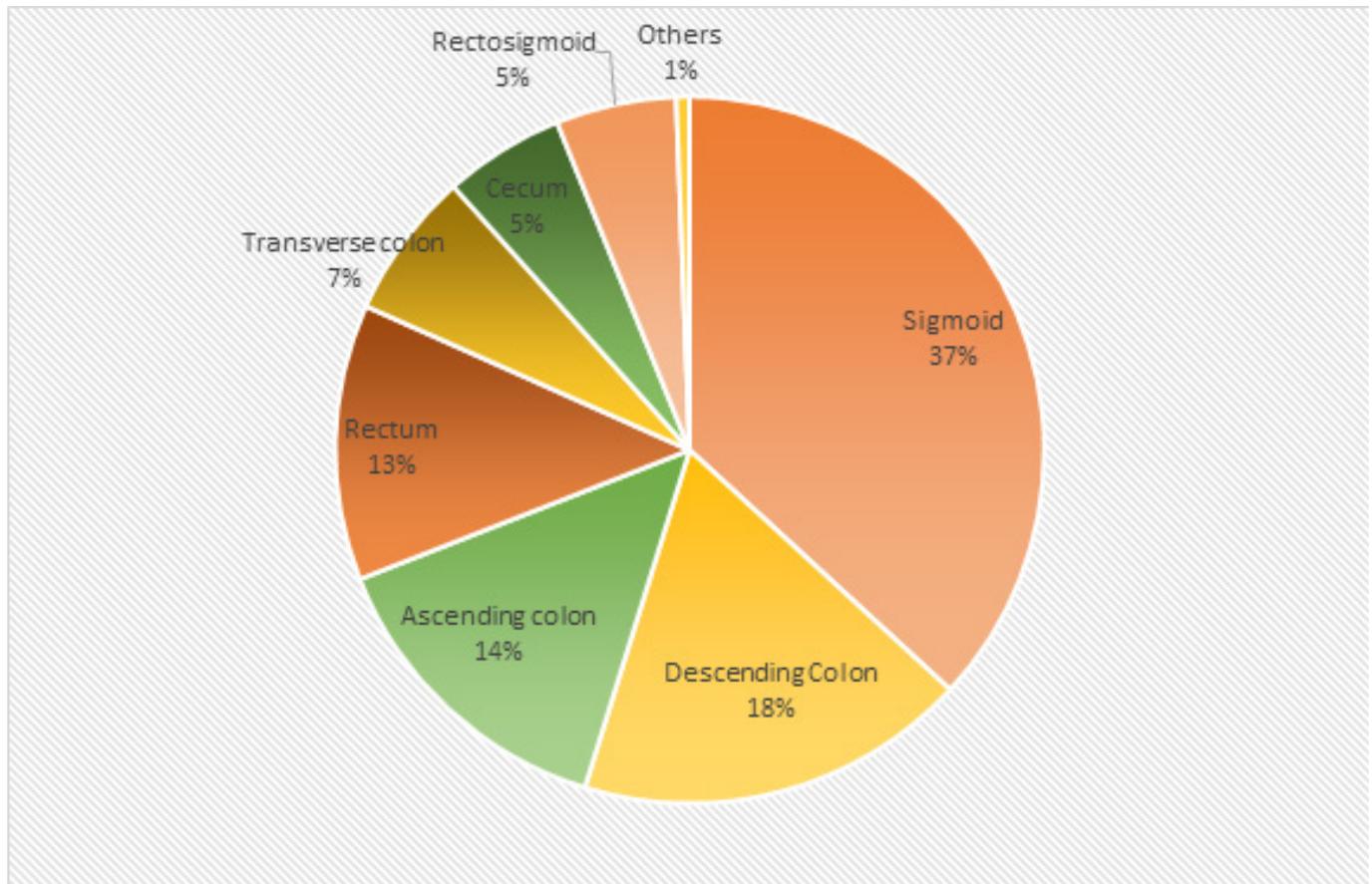


Figure 6. Location of polyp (n=499)

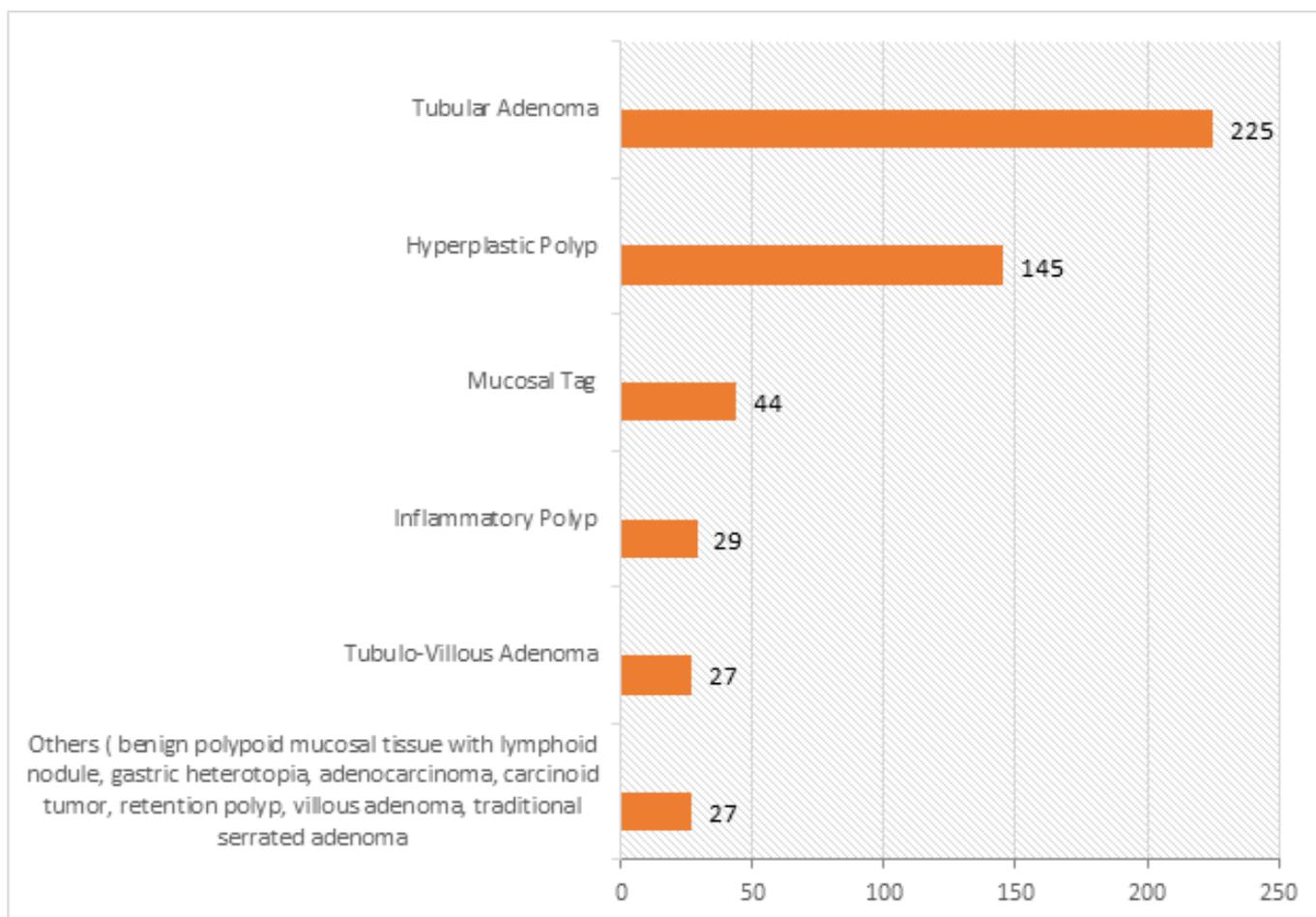


Figure 7. Type of polyp (n=497)

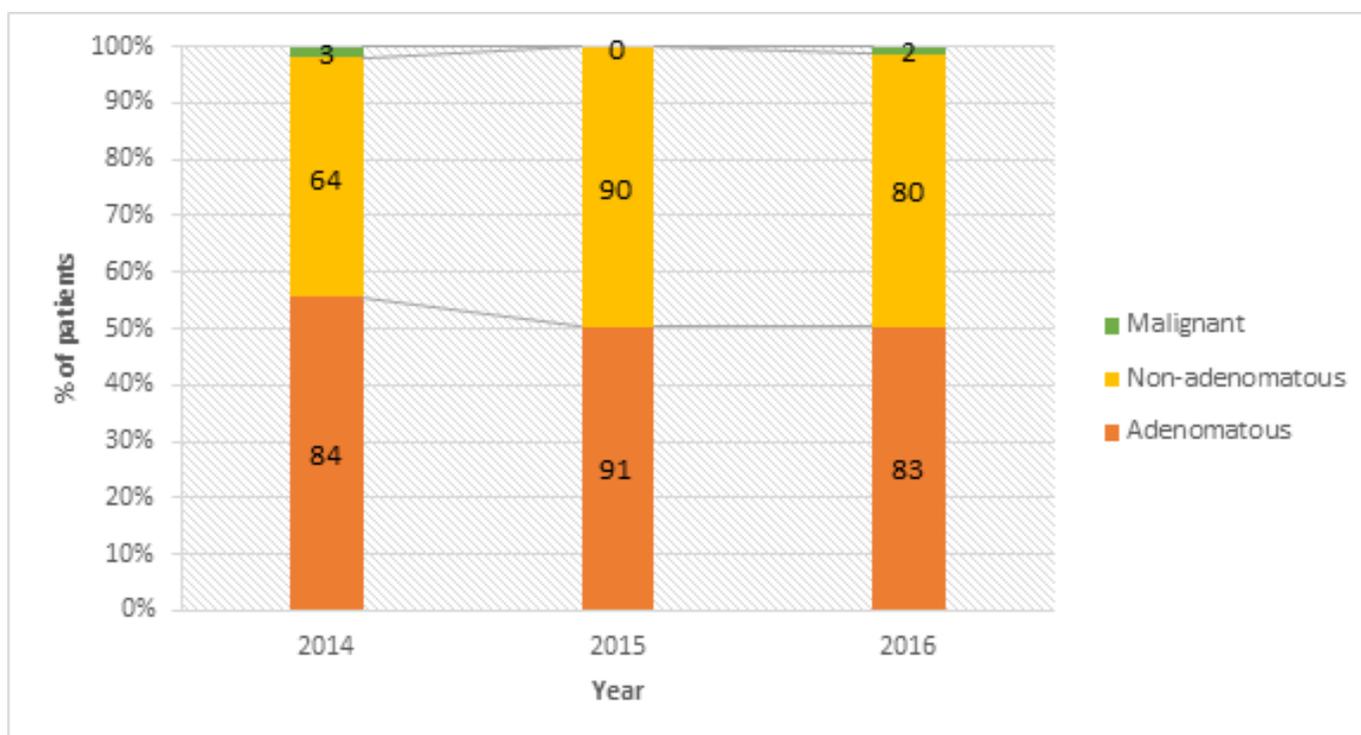


Figure 8. Prevalence of adenomatous polyps by year (n=497)

APPENDIX 2: TABLES 1-6

Table 1. Polyp description (n=467)

DESCRIPTION	N%
Sessile	105 (22)
Sessile, minute	237 (51)
Sessile, flat	12 (3)
Sessile, broad	4 (0.9)
Sessile, wide base	2 (0.4)
Pedunculated	43 (9)
Pedunculated, minute	1 (0.2)
Pedunculated, broad-based	7 (1.5)
Diminutive	16 (3)
Polypoid-like	1 (0.2)
Minute	5 (1)
Minute, flat	3 (0.6)
Polypoid	9 (1.9)
Flat	7 (1.5)
Flat, wide based	15 (3)

Table 2. Polyp type by location

LOCATION	ADENOMATOUS (n=255)	NON-ADENOMATOUS (n=230)	MALIGNANT (n=5)
Cecum	19 (7)	7 (3)	1 (20)
Ascending colon	46 (18)	24 (10)	0
Transverse colon	22 (9)	11 (5)	0
Descending colon	46 (18)	42 (18)	0
Sigmoid	85 (33)	92 (40)	3 (60)
Rectum	23 (9)	38 (17)	1 (20)
Rectosigmoid	12 (5)	15 (7)	0
Others	2 (0.8)	1 (0.4)	0

Table 3. Association of adenomatous polyp and demographic profile

CHARACTERISTICS	ADENOMATOUS POLYP		P VALUE
	WITH	WITHOUT	
Age			
<50 years old	33 (13)	46 (19)	0.002*
50-69 years old	144 (56)	149 (62)	
≥70 years old	81 (31)	44 (18)	
Sex			
Male	141 (55)	135 (57)	0.643
Female	117 (45)	103 (43)	

Table 4. Association of adenomatous polyp and general description of polyp

DESCRIPTION	ADENOMATOUS/ MALIGNANT	NON-ADENOMATOUS	P VALUE
Sessile (sessile only; minute sessile; flat sessile ; sessile broad ; wide base sessile)	191 (77)	162 (78)	0.002*
Pedunculated (pedunculated only, minute pedunculated ; broad based pedunculated)	37 (15)	14 (7)	
Others (diminutive; wide base flat; polypoid lesion minute flat polypoid ; minute ; flat)	21 (8)	33 (16)	

Table 5. Association between polyp size and nature of polyp

POLYP SIZE	ADENOMATOUS	NON-ADENOMATOUS	P VALUE
≤0.5	200 (51)	193 (49)	0.416
0.6 – 1.0	41 (62)	25 (38)	
1.1 – 1.5	10 (59)	7 (41)	
1.6 – 2.0	3 (75)	1 (25)	
>2.0	2 (50)	2 (50)	

Table 6. Patient Characteristics

CHARACTERISTICS	PATIENTS (n=302)
Gender	
Male	
2014	58
2015	53
2016	46
Female	
2014	42
2015	56
2016	46
Age (years)	
2014	
<50	26
50-69	56
≥70	18
2015	
<50	15
50-69	58
≥70	27
2016	
<50	18
50-69	60
≥70	22