

BACKGROUND

. A previous study in the Philippines during the 1990's showed that the prevalence of colorectal adenomatous polyp in autopsied Filipinos in a general hospital was low and profile were similar to those observed in low risk population (1). However, it is estimated recently that over the next two decades, the number of colorectal cancer (CRC) cases will increase from 1.2 to 2.2 million worldwide and 62% will be coming from the developing countries as a result of westernized lifestyle (2). Currently, Philippines is one of the countries with the most rapid increase in both the incidence and mortality from colorectal cancer , wherein around 17% occur in individuals below 40 years old (3,4).

In line with this, screening colonoscopy has been advocated in several countries as some polyps may have a malignant potential. The significance of reducing CRC through colonoscopy highly depends on the endoscopists' ability to identify polyps, especially the adenomatous ones. Hence, several studies have been done with regards to the anatomical distribution and histologic types of colonic polyps. Some studies showed that locations of adenomas are mainly found in the proximal colon, while other studies, depending on race states otherwise; and hyperplastic polyps are located distally where carcinoma are also usually located (5,6,7). It has also been noted in the study by Patel et.al. that there is an increasing right sided prevalence of these lesions with age, hence supporting the concept that polyps tends to appear first distally then proximally later on. (5,8,). Young patients are not an exception as studies has also shown that they are more prone to colon carcinomas located distally and prevalence of adenoma has been reported to range from 12.5% to 36% almost comparable to that of the elderly aged 50 to 60 years old (9, 6).

Significance

The result of this study may contribute to the efficacy of flexible sigmoidoscopy or colonoscopy as a screening modality in terms of the locating polyps according to a certain age group. It may support or deviates the conclusion of some studies with regards to polyp type distribution which can make race as a factor of the difference. Knowing where to focus and what to expect of a certain polyp on a given age group can improve detection rate of colorectal polyps which can significantly reduce the incidence of colorectal cancer.

Research Question:

What are the anatomical distribution and histologic type of colorectal polyps according to age among patients who underwent colonoscopy from a private institution from January 2014 to December 2018?

General Objective:

What are the anatomical distribution and histologic type of colorectal polyps according to age among patients who underwent colonoscopy?

Specific Objectives:

1. To identify the demographic profile as to age and gender of patients with colonic polyps who underwent colonoscopy from the 5 year study period
2. To determine the indications of patients with colonic polyps who underwent colonoscopy from the 5 year study period
3. To determine the location of identified colorectal polyps as to: cecum, ascending colon, transverse colon, descending colon, sigmoid colon and rectum

4. To identify the histopathologic result of the polyps sent for biopsy in patients with identified colorectal polyps as to: hyperplastic, adenoma, inflammatory, juvenile or carcinomatous
5. To determine any significance in the proportion of site of distribution of the different types of colorectal polyps as to right side or left side and the histopathologic result according to age distribution as to young (<50 years old) or old (50 years old and above)

REVIEW OF RELATED LITERATURE

Colorectal cancer is the third most common cancer worldwide which was formerly thought be a disease of the west. However, over the past few decades, its incidence has been drastically increasing in Asian countries including the Philippines, with an estimated 5-year survival in Asia ranging from 28.1% to 66% for colon cancer and 39.7% to 65.9% for rectal cancer patients (9). Although the overall incidence of CRC is declining, there is a reported concern to an increase in incidence in young patients due to lack of screening and suspicion. In fact, it is estimated that the incidence rate for colorectal cancer will increase by 90.0% for colon cancer and 124.2% for rectal cancers in patients ages 20 and 34 years old by 2030 (10).

Hence, studies have been conducted on anatomical distribution and histologic type of colorectal polyps in relation to age group. In an autopsy series, large adenomas have a distal or left sided predominance thereby supporting the adenoma-carcinoma hypothesis and in older persons (>60 years old), a shift toward more proximal colonic distribution of adenoma was noted (11). Likewise, in a study by Patel et.al., majority of the polyps reviewed were left sided and 65% of these

polyps were adenomas. Carcinoma was also observed in 7% of cases of which 37.% were left sided only, drawing into a conclusion that there is an increased right sided prevalence of adenoma and carcinoma with age (5). The study also emphasized that in the absence of left sided lesions or if only a flexible sigmoidoscopy was done, a 23% ,missed rates of adenoma and carcinoma would be expected.

On the other hand, a screening study conducted among Korean population showed that adenomas in both the young and old age group were mostly located on the proximal side or right side of the colon, with the most number of adenomas located in the ascending colon. Furthermore, a significant number of patients had adenomas in the proximal colon in those above 30 years of age. The detection rate of adenoma remains to be higher in males with a significant detection rate among those ages between 30 and 40 years old. Also in this study, hyperplastic polyps and carcinomas remained to be mostly located distally or on the left side while inflammatory polyps showed no statistical difference. Another study by Boroff et al., also showed that adenomas were more often detected in the proximal colon compared to the distal segments and that surveillance colonoscopy yielded a higher adenoma detection rate (ADR) of 40% distally and 23 % proximally, while screening as an indication showed an ADR of 20% distally and 11% proximally (7).

It is then therefore important to investigate factors such as age, location, histologic type of polyp and even the gender of the patient that can increase the detection of colonic polyps, and consider colonoscopy rather than a flexible sigmoidoscopy in certain situations so as to prevent the progression of polyps with malignant potential to full blown carcinoma.

PATIENTS AND METHODS

Study Design: Retrospective Cross Sectional Study

Study Setting: Cebu Doctors' University Hospital, Osmena Boulevard, Cebu City.

Study Population:

Inclusion Criteria: All Filipino patients regardless of age who underwent colonoscopy for various indications from January 2014 to December 2018 with an identified polyp/polyps post colonoscopy were included in this study.

Exclusion Criteria: Patients with familial adenomatous polyposis, inflammatory bowel disease, prior history of colorectal carcinoma, concomitant colonic mass or carcinoma on colonoscopy or imaging, with prior colorectal surgery and patients whose biopsy results were not retrieved were not included in the study.

Records Review:

The Colonoscopy data sheet of all 4,324 patients who underwent colonoscopy at Cebu Doctor's University Hospital from January 2014 to December 2018 were retrieved and a total of 736 eligible Filipino patients with colonic polyps were reviewed. Age, gender and indications for colonoscopy were tabulated. Age was further divided into 4 groups (<30, 30-49, 50-69 and >69 years age group). Locations of the identified polyps were noted and polyp specimen sent for biopsy were searched and categorized according to whether: hyperplastic, inflammatory, adenoma, juvenile and carcinomatous. In order to determine a significant association of the different types of colorectal polyps according to age and location, patients' age were grouped as to those less than 50 years old and those ages 50 years and

above, and as for the location, polyps found from the rectum to descending colon were grouped as left sided and for polyps from transverse to cecum were grouped as right sided. A statistical analysis was then done to determine the proportion of distribution to age. A subgroup analysis of patient harboring an adenomatous polyp was also done. Detection rate among adenomas were noted as to age, gender and location and significance in the proportion of distribution according to age, gender and location was then analyzed.

Statistical analysis:

Categorical data are expressed in frequency and percentages. Descriptive statistics for continuous variables were calculated and reported as mean standard deviation. Test for the equality of two proportions was used to get the significance of age-matched distribution of polyps. P- values are based on paired t-test and Chi-square test for continuous and categorical test respectively with a level of significance set at 0.05. Statistical analyses were performed using the Statistical Package for the Social Science (SPSS) version 22. The STROBE cohort reporting guidelines was used for this paper (12).

RESULT

A total of 736 patients with colonic polyps who fulfilled the inclusion criteria with available histopathologic results were identified among the 4,324 colonoscopies performed during the entire 5 year period of the study. There were 414 (56.3%) male patients and 322 (43.8%) were female. Age ranges from 19 to 91 years old. Ages 50 years to 69 years old comprised 60.3% (444) of the study population. Screening is the most common indication identified followed by altered bowel habits and abdominal pain. Summary of demographic profile and indications is shown in Table 1.

Table 1: Demographic profile and Indications for colonoscopy of patients with colonic polyps

Data	N (%), total 736
Gender	
Male	414(56.3)
Female	322(43.8)
Age group (in years)	
<30	21 (2.9)
30-49	122 (16.6)
50-69	444 (60.3)
>69	149 (20.2)
Indications for colonoscopy	
Screening	241 (32.7)
Altered bowel pattern	151 (20.5)
Abdominal pain	150 (20.4)
Bleeding (hematochezia, melena)	132 (17.9)
Surveillance (colonic polyp)	59 (8.0)
Positive FOBT	11 (1.5)

A total of 966 polyps with respective histologic type were identified. Most were located in the sigmoid colon (27.7%) followed by the rectum, descending, ascending, transverse, and the cecum. Adenomas comprised the majority of the polyps (47%) and were also commonly located in the sigmoid colon. Other histologic types are hyperplastic polyps, inflammatory polyps, juvenile polyps and polyps with carcinomatous features. Such carcinomatous polyp were identified in 2.07% of the study population and majority were located in the rectum. Table 2 shows the distribution in terms of anatomical location of the different histologic types of polyps.

Table 2: Anatomical colonic location of different histologic types of polyps

Histologic type	Location; N (%) total 966					
	Rectum	Sigmoid	Descending	Transverse	Ascending	Cecum
Adenoma	74	126	115	58	67	18
Hyperplastic	102	115	76	51	52	12
Inflammatory	21	16	10	7	4	8
Carcinoma	10	6	4	-	3	-
Juvenile/ retention	4	5	2	-	-	-
Total	211 (21.8)	268 (27.7)	207 (21.4)	116 (12.0)	126 (13.0)	38 (3.9)

The significance of the proportion of anatomical distribution of different histologic types in terms of age were analyzed. In this analysis, the age group was divided to those who are less than 50 years old and 50 years old and above while the anatomical distribution were grouped to either left sided (rectum to descending) and right sided (transverse to cecum) with types of polyps distributed to each respective location. The analysis excluded the 26 other patients with synchronous adenomatous polyps. As shown in table 3, 365 patients had adenoma type of polyp and a significant larger number of adenoma are located in the left side of the colon in both age group, having a p-value of 0.00. Hyperplastic as well as inflammatory polyps also showed a larger proportion of distribution on the left side of the colon. In terms of polyps with carcinomatous features, a significant difference was shown in patients above 50 years old harboring such lesions in the left side of the colon. No comparison for juvenile polyps was done since all polyps were seen in patients below 50 years old, however all were located in the left side of the colon. A summary is shown in table 3.

Table 3: Proportion of anatomic distribution of different histologic types in relation to age

Location	< 50 years (n=138)		≥50 years (n= 613)	
	No. (%)	P-value	No. (%)	P-value
Adenomatous				
Left	43 (11.8)	0.00	224 (61.3)	0.00
Right	9 (2.5)		89 (24.4)	
Hyperplastic				
Left	49 (16.3)	0.00	189 (63)	0.00
Right	9 (3)		53 (17.7)	
Inflammatory				
Left	15 (25.4)	0.00	30 (50.8)	0.00
Right	4 (6.8)		10 (16.9)	
Carcinomatous				
Left	3 (14.2)	Not applicable	15 (71.4)	0.00
Right	0		3 (14.3)	
Juvenile/retention				
Left	6 (100)	Not applicable	0	Not applicable
Right	0		0	

A subgroup analysis of patients harboring adenoma was done among 391 patients (53.1%) in which 233 were male and 158 were females. A total of 458 adenomatous colonic polyps were noted distributed either on the left side of the colon, right side, or both (Table 2). Distribution of adenomatous polyps according to gender and age category is shown in figure 1 and analysis of proportion revealed a significantly larger proportion of male patients having adenomatous type of polyp among the 50 to 69 years age group with a p-value of 0.001. A significant difference was also noted on all age group category, except from those less than 30 years of age in terms of adenoma location in which a larger proportion of adenoma is seen in the left side of the colon with a p-value of 0.000 (Figure 2).

Figure 1: Detection of colorectal adenoma in relation to age and gender

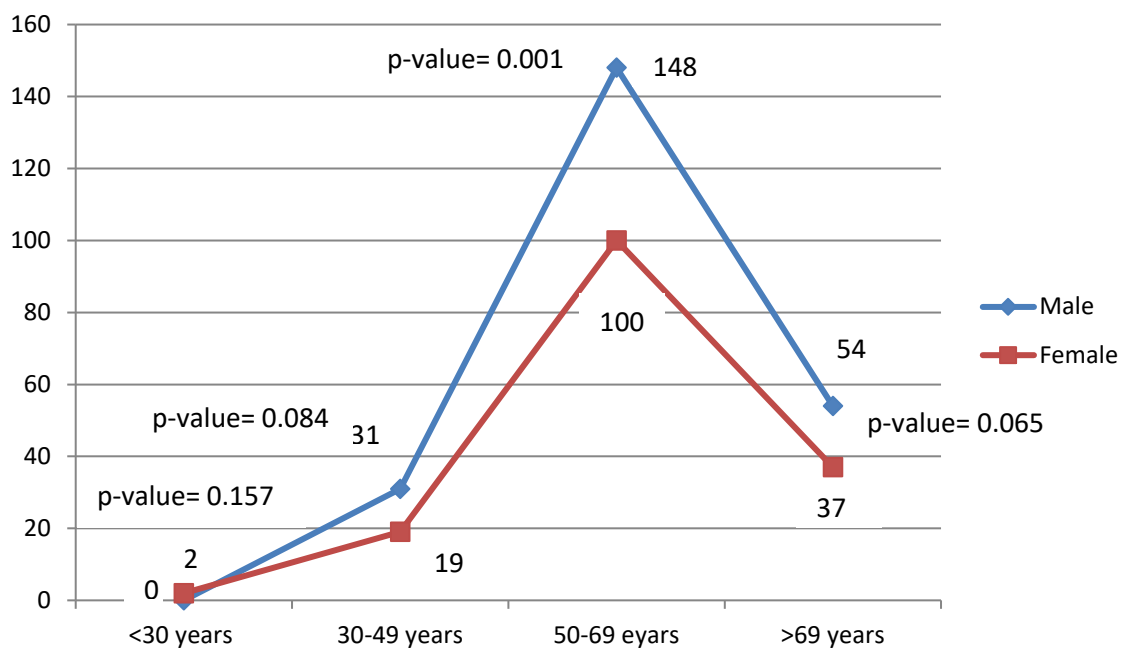
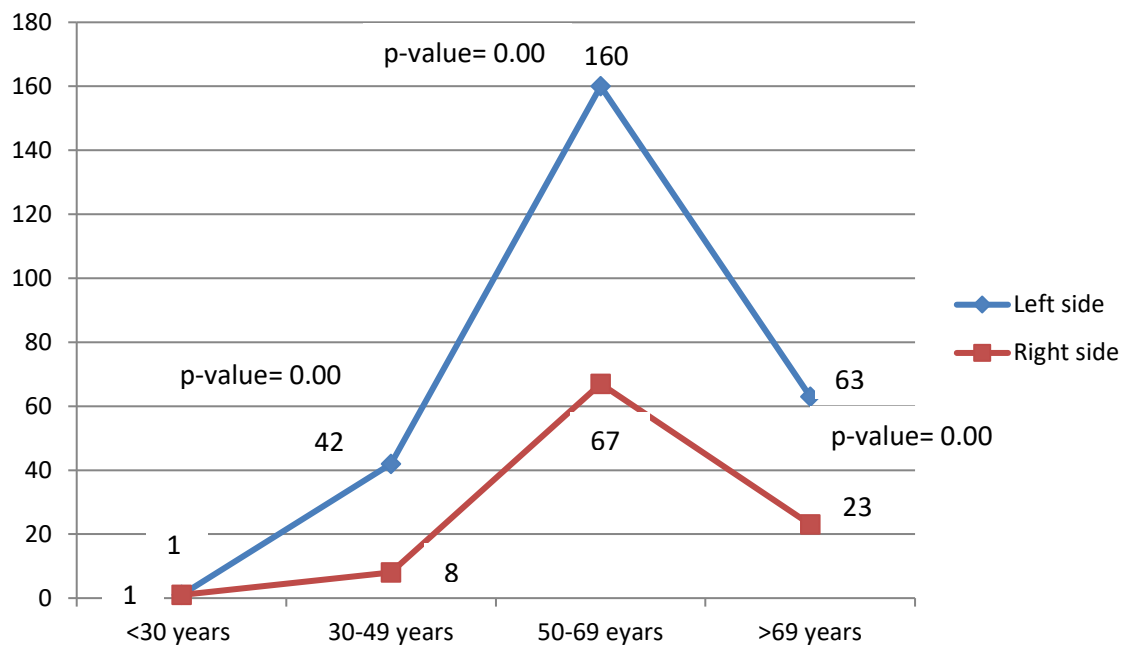


Figure 3: Detection of colorectal adenoma in relation to age and location



DISCUSSION

As colorectal cancer prevalence has been increasing in developing countries, including the Philippines, data with regards to age and appropriate screening modality to improve colorectal cancer screening is continually investigated. In this study, male patients (56.3%) still predominate the population among patients with colonic polyps and even in patients with adenomatous polyps wherein 60% are male. This matches the results in colonoscopic series that men have a higher adenoma and even carcinoma incidence compared to age-matched women (11). Around 60% of patients with colonic polyps in this study fall at an age range category of 50 to 69 years and also comprised the most number of adenomas supporting the evidence that an older age group has a higher adenoma prevalence of which, the current colorectal screening guideline recommends that screening colonoscopy should be done in patients 50 years old and above.

In general, majority of the polyps in this study, regardless of histology, were located in the left side of the colon specifically the sigmoid area aside from hyperplastic polyps which are predominant in the rectum. It is also reflected that regardless of age (except for juvenile polyps) whether young or old, there is a significant distribution of polyps on the left side of the colon. The result supported the the study of Patel et.al where in of all polyps observed, 51% of the cases were left sided and the rest were either right sided or synchronous (5) .Hyperplastic , as well as adenomatous polyps were also predominantly left sided in the same study. Likewise, in the study of Lee et al, hyperplastic polyps in both age group and carcinomatous polyps in the older age group were mainly distributed in the left side of the colon, which is the same in our study. However, in terms of adenoma, a predominant proximal distribution in both age group was noted (6), which contradicts the result of our study. It is also noted that the proportion of distribution of carcinomatous polyps was not applicable on young patients since majority were detected in patients' ages 50 years old and above. It goes to show that the incidence of carcinoma increases with age.

More than half of patients (53.1%) in this study had colonic adenoma, thus a subgroup analysis among these patients was done. Majority of the same study also shows that adenomas are the most common type of polyps identified during colonoscopy of various indications (5,6). In the subanalysis of colorectal adenomatous polyp an increasing trend of adenoma was identified in each age group and 13% of patient with such polyps belonged to the 30-49 age of which, in a study, is almost comparable to that of the elderly aged 50 to 60 years old (6). This entails that the recommendation for an earlier age screening colonoscopy should be considered. Moreover, there is a significant difference in adenoma prevalence in

terms of gender for those patients aged 50-69 years old, again supporting the evidence that older patients has higher adenoma detection rate. In terms of adenoma location and age, this study showed that a significant proportion of such histologic type is located in the left side of the colon except for those less than 30 years old. There is no shift to the right side of the colon as age increases in this study, however, results can be biased because of the unequal number of age distribution among patients with colorectal polyps. Also, as noted in this study, majority on carcinomatous polyp is located in the left side which also harbors majority of the adenomas thereby supporting the adenoma-carcinoma hypothesis. Unlike other studies that state those adenomas are usually located in the proximal colon, this study concludes otherwise. Difference in results can be due to population's race, distribution of age of study population and the study design.

The limitation of this study includes the involvement of only one tertiary hospital in Cebu City which may lead to underestimation or overestimation of results. The data that were utilized in this study were based solely on what is provided in the patient's medical record at the endoscopy unit and the histopathology computer data base record. It is important to note that there are still many factors that should be considered in the association of different histologic type of polyps with regard to age-matched distribution. One should also consider the size, the shape and symptom related correlation in colonic polyps as larger and symptomatic polyps are more likely to be of neoplastic potential. Therefore, size and shape classification should be included in every reporting of the gastric and colon polyps and analysis of the indications should also be evaluated. A full colonoscopy should be done in patients that require appropriate inspection based on history and indication and should not be biased with age.

CONCLUSION

These data supports that majority of the polyps, including adenoma are usually located in the left side of the colon, specifically the sigmoid with detection still noted to be higher in patients above 50 years old. However, we cannot disregard the number of adenomas detected in young patients thus could form a bases for earlier screening initiation.

REFERENCES

1. Cajucom C, Barrios G, Cruz L, Varin C and Herrera L. Prevalence of Colorectal Polyps in Filipinos: An Autopsy Study. *Dis Colon Rectum* 1992; 35: 676-680.
2. Pourhoseinghol, Mohamad Amin. Epidemiology and burden of colorectal cancer in Asia-Pacific region: What shall we do now?. *Transl Gastrointest Cancer* 2014; 3(4):169-173.
3. Arnold M et al. Global patterns and trends in colorectal cancer incidence and mortality. *Gut* 2016;0:1-9.doi:10.1136/gutjnl-2015-310912.
4. Marley A and Nan Hongmei. Epidemiology of Colorectal Cancer. *Int L Mol Epidemiol Genet* 2016; 7 (3): 105-114.
5. Patel K and Hoffman N. The Anatomical Distribution of Colorectal Polyps at Colonoscopy. *J Clin Gastroenterol* 2001; 33(3):222-225.
6. Lee SY, Song WH, Oh SC, Min BW and Lee SI. Anatomical distribution and detection of colorectal neoplasms according to age in the colonoscopic screening of a Korean population. *Annals of Surgical Treatment and Research* 2018; 94(1): 36-43.
7. Boroff E, Disbrow M, Crowell M and Ramirez F. Adenoma and Polyp Detection Rates in Colonoscopy according to Indication. *Gastroenterology Research and Practice* 2017;1-6.
8. Pourhoseinghol, Mohamad Amin. Increased burden of colorectal cancer in Asia. *World Journal of Gastrointestinal Oncology* 2012; 4 (4):68-70.
9. Park S and Jee SH. Epidemiology of Colorectal Cancer in Asia-Pacific Region. *Surgical Treatment of Colorectal Cancer* 2018.https://doi.org/10.1007/978-981-10-5143-2_1.

10. Deng Y. Rectal Cancer in Asia vs. Western Countries: Why the variation in Incidence?. *Current Treatment Options in Oncology* 2017; 18:64.
11. Felman, Mark, et.al. *Sleisenger and Fordtran's Gastrointestinal and Liver Disease* 10th edition; United States of America: Saunders, imprint of Elsevier Inc, 2016. Print.
12. Von Elm, Altman DG, Egger M, Pocock SJ, Gotsche PC, Vandenbroucke JP. The Strengthening the reporting of Observational Studies in Epidemiology (STROBE) Statement: guidelines for reporting observational studies.