ORIGINAL ARTICLE − OPEN ACCESS

Distribution of Colon Lesions in the Elderly

Oktay Bulur[1], Şebnem Gürsoy[1], Kemal Deniz[2], Ömer Özbakır[1], Kadri Güven[1], Alper Yurci[1], Gülten Can Sezgin[1], Mustafa Özel[1], Burcu Bozkurt Burgucu[1], Yavuz Özden[1], Vusal Abdurahmanov[1], Mihriban Yıldırım[3]

ABSTRACT

Objective: Screening and surveillance for colon lesions is very important, particularly given the increased incidence of benign and malign colon diseases with age. The aim of this study was to determine the frequency and characteristics of colon lesions in an elderly population in Turkey.

Materials and Methods: This retrospective study was conducted in the gastroenterology clinic of the Erciyes University Faculty of Medicine Hospital. The histopathological results and demographic characteristics of 1004 elderly patients who underwent a colonoscopy with a biopsy between 2015 and 2019 were retrospectively analyzed.

Results: A total of 1004 elderly patients were included in the study. The findings revealed that 592 (58.9%) of the patients had polyps, 121 (12.05%) had colitis, 23 (2.3%) had ileitis, 88 (8.7%) had colon carcinoma, 2 (0.2%) had amyloidosis, 34 (3.4%) had other histopathological diagnoses (in order of frequency, melanosis coli, lipoma, solitary rectal ulcer, neuroendocrine tumor, leiomyoma, mantle cell lymphoma, marginal zone lymphoma and 1ow grade dysplasia), and 22 patients had multiple synchronous pathologies.

Conclusion: Colon pathology types and frequencies differ with advanced age. Appropriate colonoscopy screening programs and multiple histopathological sampling methods from each colon segment during colonoscopy offer early recognition of both benign and malignant colon lesions.

Keywords: Aging, colon disease, colonoscopy, colorectal adenocarcinoma, inflammatory bowel disease

[1]Department of Gastroenterology, Erciyes University Faculty of Medicine, Kayseri, Turkey
[2]Department of Pathology, Erciyes University Faculty of Medicine, Kayseri, Turkey
[3]Department of Internal Medicine, Erciyes University Faculty of Medicine, Kayseri, Turkey

Correspondence
Oktay Bulur,
Erciyes University Faculty of Medicine, Department of Gastroenterology, Kayseri, Turkey
Phone: +90 352 207 66 66
e-mail: oktaybulur34@gmail.com

INTRODUCTION

Advancements in much of the world, such as more effective treatment of disease, decreased child mortality, better access to clean water and improved sanitation and hygiene conditions, and a declining number of war deaths, have extended the average life span and life expectancy. However, the complications of a growing elderly population and providing the needed care for this group have become an important challenge.

The World Health Organization (WHO) classified individuals aged 65 years or more as elderly. Gerontologists then refined the classification of the adults between the ages of 65 and 74 years as youngest-old, those between ages 75 and 84 years as middle-old, and those aged over 85 years as oldest-old (1, 2)

Among the physiological changes related to aging are alterations in gastrointestinal tract physiology, functions, and gut microbiota. These changes can include decreased masticatory function and taste, swallowing problems, reduced salivary production, impaired esophageal motility, reduced digestive enzymes and secretions, reduced intestinal absorption, and abundance of *Clostridia*, *Lactobacilli*, *Streptococci* and *Enterobacteriaceae* in the fecal microbiota (3, 4).

The incidence of colorectal cancer, constipation, diverticular disease, *Clostridioides difficile* colitis, irritable bowel syndrome, inflammatory bowel disease (IBD), and some gastrointestinal diseases is often high in the elderly (5, 6).

Due to the greater incidence of benign and malign colon diseases in old age, various screening and surveillance guidelines have been published. A colonoscopy is the most recommended and used technique (7).

The aim of this study was to determine the characteristics of colon lesions in an elderly population in Turkey.

MATERIALS and METHODS

This study was approved by the Erciyes University Faculty of Medicine Ethics Committee on November 27, 2019 (no: 2019/808).

Table 1. Histopathological diagnoses of the patients

	Total		Male		Female		p
	n=1004	%	n=576	%	n=428	%	
Colon polyps◊	592	59	356	61.8	236	55.1	0.034*
Colitis¥	121	12.1	77	13.4	44	10.3	0.009*
Colon carcinoma	88	8.8	49	8.5	39	9.1	0.410
IleitisΩ	23	2.3	21	3.6	2	0.5	0.001*
Other pathologies†	34	3.4	11	1.9	22	5.4	0.003*

*: Significant at 0.05 level; chi-squared test. ◊: Polyp: Adenomatous, serrated, inflammatory, hamartomatous, more than 1 type; ¥: Colitis: U. colitis, focally active colitis, diffuse active colitis, ischemic colitis, infectious colitis, collagenous colitis, radiation colitis, eosinophilic colitis, Crohn's disease; Ω: Ileitis: Crohn's Disease, backwash Melanosis coli ileitis, not d efinite; †: Other pathologies: Melanosis coli, solitary rectal ulcer, neuroendocrine tumor, mantle cell lymphoma, marginal zone lymphoma, low-grade dysplasia

Table 2. Synchronous lesions

	n
Synchronous lesions with polyps	
Polyp+Diffuse active colitis	2
Polyp+Focal active colitis	2
Polyp+Eosinophilic colitis	1
Polyp+Ulcerative colitis	3
Polyp+Mantle cell lymphoma	1
Polyp+Ileitis	1
Polyp+Colon carcinoma	1
Polyp+Neuroendocrine tumor	2
Polyp+Marginal zone lymphoma	1
Polyp +Melanosis coli	3
Synchronous lesions with İleitis	
Ileitis+Focal active colitis	3
Ileitis+Ulcerative colitis	1
Other Synchronous lesions	
Ulcerative colitis+Low-grade dysplasia	1

Table 3. Comparison of age and gender in patients with abnormal and normal findings

Variables	Abnormal (n=838)	Normal (n=166)	p
Age (years), mean±SD	73.33±6.17	71.8±5.06	0.008*
Gender, n (%)			0.001*
Female	338 (40.3)	90(54.2)	
Male	500 (59.7)	76(45.8)	

*: Significant at 0.05 level; Mann-Whitney U test for numerical variables, chi-squared test for categorical variables; SD: Standard deviation

Variables with skewed distribution were expressed as median (interquartile range 25th–75th percentile), and categorical variables were expressed as a percentage. The Mann-Whitney U was used for the comparison of non-normally distributed variables between 2 groups. A chi-squared test was used to investigate the relationship between 2 categorical variables. A 2-sided p value of <0.05 was considered to be statistically significant. IBM SPSS Statistics for Windows, Version 24.0 software (IBM Corp., Armonk, NY, USA) was used to perform the analyses.

RESULTS

In all, 1004 elderly patients (mean age: 73.07 years; min–max: 65–99 years) were enrolled in the study, 428 of whom were female (42.6%), and 576 of whom were male (57.4%). Abnormal results were recorded in 838 patients (83.5%) and 166 had normal results (16.5%).

Polyps were noted in 592 (58.9%) of the patients, 121 (12.05%) had colitis, 23 (2.3%) had ileitis, 88 (8.7%) had colon carcinoma, 2 (0.2%) had amyloidosis, 34 (3.4%) had other histopathological diagnoses (in order of frequency, melanosis coli, lipoma, solitary rectal ulcer, neuroendocrine tumor, leiomyoma, mantle cell lymphoma, marginal zone lymphoma and 1ow grade dysplasia), and 22 patients had multiple synchronous pathologies (Tables 1–3).

In the polyp group, 407 (68.7%) of the patients had findings of only adenomatous polyps, 73 (12.4%) had only serrated polyps, 41 (6.9%) had only inflammatory polyps, and 1 (0.2%) had hamartomatous polyps.
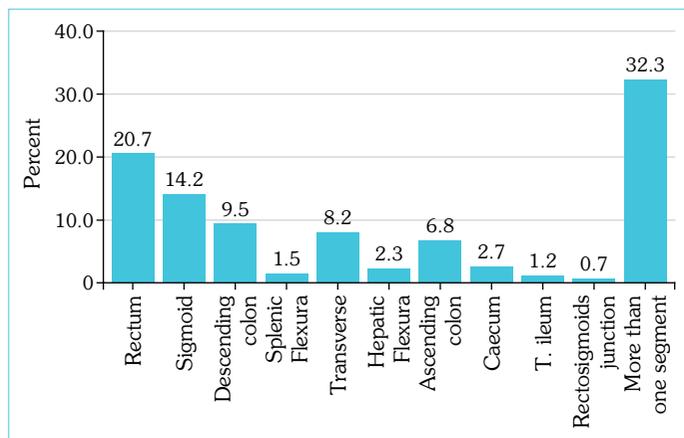
This study was conducted in the gastroenterology clinic of the Erciyes University Faculty of Medicine Hospital. The histopathological results and demographic details of 1004 elderly patients who underwent a colonoscopy for appropriate indications and had a biopsy conducted during the procedure in the endoscopy unit between 2015 and 2019 were retrieved from the hospital database for analysis. Patients who had repeated diagnoses were excluded from the study. The results were primarily grouped based on a normal or abnormal diagnosis. The abnormal results were then categorized according to the frequency of the pathology: polyps, colitis, ileitis, colon carcinoma, amyloidosis, other histopathological diagnoses, and multiple synchronous pathologies. The patients who had polyps, colitis, and colon carcinoma were subsequently separated according to the subtype.

Statistical Analysis

The distribution of the continuous variables was determined using the Kolmogorov-Smirnov and the Shapiro-Wilk tests. Continuous variables with normal distribution were expressed as mean±SD.

Figure 1. Localization of the colon polyps

Figure 2. Localization of the colon carcinomas

Seventy (11.8%) patients had >1 histopathological type of polyps: 38 had adenomatous polyps and serrated polyps (35 hyperplastic, 1 serrated, 1 sessile serrated), 25 had adenomatous polyps and inflammatory polyps, 4 had inflammatory polyps and hyperplastic polyps, 2 had adenomatous polyps + inflammatory polyps + hamartomatous polyps and 1 patient had adenomatous polyps + inflammatory polyps + hyperplastic polyps.

A total of 473 patients were diagnosed with adenomatous polyps, and the most common, tubular adenoma, was observed in 418 (88.3%) patients. Tubulovillous adenoma was seen in 32 (6.7%), villous adenoma in 11 (2.4%), and multiple-type adenomatous polyps in 12 (2.6%).

Of the 118 patients diagnosed with serrated lesions, 114 (96.6%) had hyperplastic polyps, 3 (2.55%) had traditional serrated adenomas, and 1 patient had sessile serrated polyps.

The overall frequency of colon polyps was higher in males than females (p=0.034). Evaluation of the colon polyp type indicated that while adenomatous and serrated polyps were more commonly seen in males than females, there was no statistically significant difference between male and female patients in other polyp types.

Colon polyps were often recorded in >1 localization (32.3%). The most common region of single involvement in the colon was the rectum (20.7%) (Fig. 1).

Analysis of the colonoscopy reports of patients diagnosed with ileitis revealed that 7 of these patients had Crohn's disease, 1 had backwash ileitis due to ulcerative colitis, and the remaining 15 patients had no definitive determination of cause. Ileitis was more common in males than females (p=0.001).

In all, 47 (33.8%) of the 121 patients who were diagnosed with colitis had ulcerative colitis, 33 (23.7%) had focal active colitis, 18 had (12.9%) non-specific colitis, 15 (10.8%) had diffuse active colitis, 12 (8.6%) had ischemic colitis, 1 (0.7%) had Crohn's disease, 1 (0.7%) had eosinophilic colitis, 1 (0.7%) had radiation colitis, 7 (5.03%) had infectious colitis, and 4 (2.8%) patients had collagenous colitis.

Among the patients who were diagnosed with ileitis caused by IBD, there were 48 with ulcerative colitis and 8 with Crohn's disease. Colitis was more common in males (p=0.009); both ul-
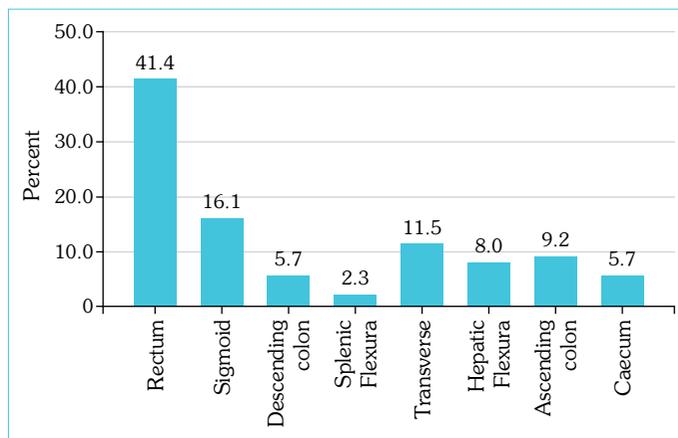
cerative colitis and Crohn's disease were more common in males. The rectum was the most frequent colon segment location in all cases of colitis (30%). Analysis of the colitis type localization patterns indicated that there was multiple segment involvement (40%) in patients diagnosed with ulcerative colitis, Crohn's disease, focal active colitis, diffuse active colitis, non-specific colitis, ischemic colitis, or eosinophilic colitis. The most common sites of involvement in collagenous and infectious colitis were the ascending colon and the rectum.

Colon cancers were most frequently located in the left colon (65.5%). The involved area of the colon was 41.6% rectum, 16.1% sigmoid, 11.5% transverse colon, 9.2% ascending colon, 8% hepatic flexura 5.7% descending colon 5.7% caecum, and 2.3% splenic flexura (Fig. 2). There was no statistically significant difference between males and females among patients diagnosed with colon carcinoma (p=0.410).

When the patients were grouped by age (65–74, 75–84, >84 years), adeno cancer was more frequent in the 65–74 group (p=0.001); there was no statistically significant difference according to age group in the other colon pathologies (Table 4).

The most common polyp type was adenomatous polyps in all 3 age groups. The most common type of colitis in the 65–74 age group was ulcerative colitis, while ulcerative colitis and focal active colitis were most common in the 74–84 age group. Focal active colitis was the most common type of colitis in the >84 age group.

DISCUSSION

While other research has examined the overall incidence of colon polyps in Turkey, few studies have reported the distribution of colon pathologies in the geriatric population. In this study, we found that the most common lesion in the geriatric population was colon polyps and the most common type of colon polyp was an adenomatous polyp. Ulcerative colitis was the most common type of colitis (4.7%) and the frequency of Crohn's disease was 0.8%. Evaluation of the localization features revealed that the lesions frequently involved >1 segment of the colon and that the most frequently involved regions were the rectum and sigmoid.

Sahinturk et al. (8) reported that in a study group of patients aged >18 years, the incidence of colon polyps (34.9%) was low-

Table 4. Comparison by age group among patients with abnormal findings

	Age groups (years)			
	65–74 (n=649)	75–84 (n=302)	>84 (n=53)	p
Polyp				0.308
Presence◊	373 (57.5)	189 (62.6)	30 (56.6)	
Absence	276 (42.5)	113 (37.4)	23 (43.4)	
Adenoma				0.159
Presence§	292 (45)	156 (51.7)	25 (47.2)	
Absence	357 (55)	146 (48.3)	28 (52.8)	
Inflammatory				0.140
Presence	53 (8.2)	14 (4.6)	4 (7.5)	
Absence	596 (91.8)	288 (95.4)	49 (92.5)	
Hamartomatous				
Presence	1 (0.2)	2 (0.7)	0 (0)	
Absence	648 (99.8)	300 (99.3)	53 (100)	
Serrated				0.840
Presence£	76 (11.7)	37 (12.3)	5 (9.4)	
Absence	573 (88.3)	265 (87.7)	48 (90.6)	
Ileitis				
PresenceΩ	21 (3.2)	2 (0.7)	0 (0)	
Absence	628 (96.8)	300 (99.3)	53 (100)	
Amyloidosis				
Presence	1 (0.2)	1 (0.3)	0 (0)	
Absence	648 (99.8)	301 (99.7)	53 (100)	
Colitis				0.373
Presence¥	85 (13.1)	30 (9.9)	6 (11.3)	
Absence	564 (86.9)	272 (90.1)	47 (88.7)	
Adenocarcinoma				0.001*
Presence	46 (7.1)	27 (8.9)	15 (28.3)	
Absence	603 (92.9)	275 (91.1)	38 (71.7)	
Other pathologies				0.582
Presence†	20 (3.1)	11 (3.6)	3 (5.7)	
Absence	629 (96.9)	291 (96.4)	50 (94.3)	

*: Significant at 0.05 level, Pearson chi-squared and likelihood ratio test for sample size; ◊: Polyp: Adenomatous, serrated, inflammatory, hamartomatous, more than 1 type; £: Serrated: Hyperplastic, serrated, sessile serrated; §: Adenoma: Tubular, tubulovillous, villous, more than 1 type; Ω: Ileitis: Crohn's disease, backwash ileitis, not definite; ¥: Colitis: U. colitis, focally active colitis, diffuse active colitis, ischemic colitis, infectious colitis, collagenous colitis, radiation colitis, eosinophilic colitis, Crohn's disease; †: Other pathologies: Melanosis coli, solitary rectal ulcer, neuroendocrine tumor, mantle cell lymphoma, marginal zone lymphoma, low grade dysplasia

that there was a male prevalence. The frequency of colon polyps was greater in males than females in our study as well. Uçmak et al. (9) analyzed a group with a similarly broad age group (15–100 years old) and found a colon polyp incidence of 27.8%. They also noted that the most frequent polyp type was adenomatous. The polyps were classified histopathologically as 53.6% adenomatous polyp, 31.7% hyperplastic polyp, 6.6% cancer, and 3.0% other (according to frequency, serrated adenoma, juvenile polyp, inflammatory polyp, hamartomatous polyp, lipoma, and lymphoma). In a study involving only elderly patients, Yanık et al. (10) observed results similar to those of our study: the colon polyp incidence was 58.46%, the most common type of colon polyp was adenomatous, and the rate of polyp findings was higher in males.

Recent studies from less developed and developed countries have reported different results regarding the incidence and characteristics of colon polyps. A study of 125 adult patients that investigated the clinicopathological features of colon polyps and colon cancers in Nigeria found that the most frequent colon segment of localization was the sigmoid colon (44.4%). The most common type of polyp seen was inflammatory polyps (22.2%) (11). Another study from a single institution in Pakistan reported an incidence of colon polyps of 7.91% (12). Bafandeh et al. (13), from Iran, observed a polyp incidence of 14.4% in colonoscopies performed on a group aged 12–120 years, and tubular adenoma (75.5%) was the most common polyp type. In a study from the USA, Rex et al. (14) determined a prevalence of ≥1 conventional adenoma in 48.5% of patients aged ≥50 years. Zhou et al. (15) recorded an adenoma incidence of 22.4% among patients aged ≥70 years. Differences in the polyp incidence may be due to dietary and other habits, geographical and genetic characteristics of the patients, or differences in the mean age of the patients.

According to WHO statistics, the incidence of colon carcinoma in the 65–84 age group in Turkey is 140/100000. The incidence of colon carcinoma in the same age group is 153.9/100000 in the USA, 228.5/100000 in the UK, 213.5/100000 in France, and 186.3/100000 in Germany (16). The frequency of colon carcinoma in our study was 8.7%.

There are few studies of demographic and characteristic features of colorectal cancer patients in Turkey. Only 1 of these studies was specific to the elderly population. Yanık et al. (10) found a rate of colorectal carcinoma of 12.31% in elderly patients. In a study conducted by Kara et al. (17) in which the mean age was 56 (50–70) years, the incidence of colon carcinoma was 4% and the most frequent localization was the descending colon (25%). In our study, the most common site of the colon carcinoma was the rectum. Ünal et al. (18) found a frequency of colon carcinoma (6.2%) that was lower than our results, but similarly, the most common localization of colon carcinoma was the rectum (38.4%). They also reported no statistical difference in terms of gender and colon carcinoma frequency. The lower mean age in that study may explain the different incidence results.

A worldwide population-based study of the incidence and prevalence of IBD noted that the highest incidence of Crohn's disease in North America was in Canada, at a rate of 23.82/100000; in Europe, the highest incidence was seen in Italy, at 15.4/100000; and

er than that seen in our study (58.9%). We found that the most common polyp type was adenomatous polyps. They reported an incidence of 74.3% adenomatous polyps, 11.9% hyperplastic polyps, and 1.1% serrated polyps. The most common localization of the colon polyps was the rectum (36.9%), as in our study. In addition, they reported that the incidence of adenomatous type polyps and the size of the polyps increased with age and

in Asia, the highest incidence was seen in Israel, at 8.4/100000. The highest incidence of ulcerative colitis in North America was in Canada, at 23.14/100000; in Europe, the highest incidence was seen in the Faroe Islands, at a rate of 57.9/100000; and in Asia, the highest incidence was seen in Israel, at 6.5/100000 (19, 20).

There has been substantial research to investigate the incidence and prevalence of IBD in Turkey. Buran (21) reported an incidence of ulcerative colitis of 2.6/100000 and an incidence of Crohn's disease of 1.4/100000. In a multi-center study that included all age groups, Tozun et al. (22) found the incidence of ulcerative colitis and Crohn's diseases to be 4.4/100000 and 2.2/100000, respectively. Can et al. (23) found that the prevalence was 12.53/105 and 31.83/105 for Crohn's disease and ulcerative colitis, respectively, in a study of the Black Sea region. We found a frequency of ulcerative colitis and Crohn's disease of 4.7% and 0.8%, respectively, in this study.

Systemic amyloidosis is commonly diagnosed after 50 years of life. The literature results of incidence rates vary, however a reported age-independent incidence of systemic amyloidosis is 0.9/100000 per year (24). In England, the incidence rate was found to be 0.3–0.5/100000 (25). In another study, Hemminki et al. (26) reported an incidence in Sweden of 0.32/100000. Kyle et al. (27) noted an incidence of systemic amyloidosis using age groups of 60–69, 70–79, and >80 of 2.8%, 8.7%, and 8.8%, respectively.

In a study that examined the gastrointestinal involvement in systemic amyloidosis, Lim et al. (28) found a frequency of gastric involvement in patients diagnosed with amyloidosis of 11%. A literature review using Medical Subject Headings (MeSH) terms for amyloidosis did not reveal a study related to the gastrointestinal involvement of systemic amyloidosis in Turkey. In our study, 2 (0.2%) patients were diagnosed with systemic amyloidosis with gastrointestinal involvement.

The present study has several limitations. We retrospectively scanned only histopathology reports, and therefore we could not show which patients were newly diagnosed and which patients had been previously diagnosed. In addition, we did not have any information about whether patients underwent colonoscopy for screening or diagnostic purposes. Finally, there were no data about medication usage of patients or which patients had symptoms.

CONCLUSION

The incidence of colon pathologies, like other organ pathologies, increase with age. Appropriate colonoscopy screening programs and multiple histopathological sampling methods from each colon segment during a colonoscopy can provide early recognition of both benign and malignant colon lesions. Since the distribution of colon lesions varies, the development of colonoscopy screening programs should begin with large population-based epidemiological studies.

REFERENCES

1. Lee SB, Oh JH, Park JH, Choi SP, Wee JH. Differences in youngest-old, middle-old, and oldest-old patients who visit the emergency department. Clin Exp Emerg Med 2018; 5(4): 249–55. [CrossRef]
2. Büyükşimşek M, Kara İO. Aging biology, geriatric patient definition and oncological approaches to these patients. In: Ozcelik C, editor. Chest Surgery in the Elderly. 1st edition. Ankara: Turkish Clinics; 2019. p.1–5.
3. An R, Wilms E, Masclee AAM, Smidt H, Zoetendal EG, Jonkers D. Age-dependent changes in GI physiology and microbiota: time to reconsider? Gut 2018; 67(12): 2213–22. [CrossRef]
4. Santoro A, Ostan R, Candela M, Biagi E, Brigidi P, Capri M, et al. Gut microbiota changes in the extreme decades of human life: a focus on centenarians. Cell Mol Life Sci 2018; 75(1): 129–48. [CrossRef]
5. Dumic I, Nordin T, Jecmenica M, Stojkovic Lalosevic M, Milosavljevic T, et al. Gastrointestinal tract disorders in older age. Can J Gastroenterol Hepatol 2019; 2019: 6757524. [CrossRef]
6. Smith BD, Smith GL, Hurria A, Hortobagyi GN, Buchholz TA. Future of cancer incidence in the United States: burdens upon an aging, changing nation. J Clin Oncol 2009; 27(17): 2758–65. [CrossRef]
7. Rex DK. Colorectal cancer screening. Gastrointest Endosc Clin N Am 2020; 30(3): XV–I. [CrossRef]
8. Şahintürk Y, Çekin AH. Colon polyps localization, histology, and size - five years colonoscopic research. Endoskopi Gastrointestinal 2018; 26: 57–60.
9. Uçmak F, Tuncer ET, Ekin N, Büyükbayram H, Kaya M. Incidence and characteristics of colon polyps in Southeast Anatolian Region: A 5-Year evaluation. Turk J Colorectal Dis 2016; 2: 21–6. [CrossRef]
10. Yanık S, Akkoca AN, Özdemir ZT, Sözütek D, Yılmaz EE, Sayar S. Evaluation of results of lower gastrointestinal endoscopic biopsi. Int J Clin Exp Med 2014; 7(12): 5820–5.
11. Oluyemi A, Awolola N, Oyedeji O. Clinicopathologic review of polyps biopsied at colonoscopy in Lagos, Nigeria. Pan African Med J 2016; 24: 333. [CrossRef]
12. Mohammad S, Rind GH, Shah IA, Baloch I, Shah AA, Lakho S, et al. Colonoscopy findings: A single institution study from Pakistan. Cureus 2019; 11(11): e6167. [CrossRef]
13. Bafandeh Y, Yazdanpanah F. Distribution pattern of colorectal diseases based on 2300 total colonoscopies. Gastroenterol Hepatol Bed Bench 2017; 10(2): 90–6.
14. Rex DK, Sullivan AW, Perkins AJ, Vemulapalli KC. Colorectal polyp prevalence and aspirational detection targets determined using high definition colonoscopy and a high level detector in 2017. Dig Liver Dis 2020; 52(1): 72–8. [CrossRef]
15. Zhou H, Shen Z, Zhao J, Zhou Z, Xu Y. Distribution characteristics and risk factors of colorectal adenomas. [Article in Chinese]. Chinese J Gastrol Surg 2018; 21(6): 678–84.
16. UICC. Global cancer Data: GLOBOCAN, 2018. Available from: URL: www.uiccorg/new-global-cancer-data-globocan-2018. Accessed March 24, 2022.

17. Kara Y, Sarıcı İŞ, Kalaycı MU. Evaluation of the effectiveness of colon cancer screening program conducted in our region. İKSSTD 2019; 11(1): 31–6. [CrossRef]

18. Ünal NG, Coşgun G, Korkut M, Özütemiz AÖ, Doğanavşargil B, Çakar B, et al. Epidemiologic and survival characteristics of patients with colorectal cancer in Ege University Medical Faculty database. Ege J Med 2019; 58(Supp): 68–77. [CrossRef]

19. Ng SC, Shi HY, Hamidi N, Underwood FE, Tang W, Benchimol EI, et al. Worldwide incidence and prevalence of inflammatory bowel disease in the 21st century: a systematic review of population-based studies. Lancet 2017; 390(10114): 2769–78. Erratum in: Lancet 2020; 396(10256): e56. [CrossRef]

20. GBD 2017 Inflammatory Bowel Disease Collaborators. The global, regional, and national burden of inflammatory bowel disease in 195 countries and territories, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017. Lancet Gastroenterol Hepatol 2020; 5(1): 17–30.

21. Buran T. Inflammatory bowel disease; epidemiology, prevalence, incidence. Turkish Clinics J Gastroenterohepatol 2017; 10(1): 15–7.

22. Tozun N, Atug O, Imeryuz N, Hamzaoglu HO, Tiftikci A, Parlak E, et al; Members of the Turkish IBD Study Group. Clinical characteristics of inflammatory bowel disease in Turkey: a multicenter epidemiologic survey. J Clin Gastroenterol 2009; 43(1): 51–7. [CrossRef]

23. Can G, Poşul E, Yılmaz B, Can H, Korkmaz U, Ermiş F, et al. Epidemiologic features of inflammatory bowel disease in Western Blacksea region of Turkey for the last 10 years: retrospective cohort study. Korean J Intern Med 2019; 34(3): 519–29. [CrossRef]

24. Desport E, Bridoux F, Sirac C, Delbes S, Bender S, Fernandez B, et al; Centre national de référence pour l'amylose AL et les autres maladies par dépôts d'immunoglobulines monoclonales. Al amyloidosis. Orphanet J Rare Dis 2012; 7: 54. [CrossRef]

25. Gertz MA, Dispenzieri A. Systemic amyloidosis recognition, prognosis, and therapy: A systematic review. JAMA 2020; 324(1): 79–89. [CrossRef]

26. Hemminki K, Li X, Försti A, Sundquist J, Sundquist K. Incidence and survival in non-hereditary amyloidosis in Sweden. BMC Public Health 2012; 12: 974. [CrossRef]

27. Kyle RA, Larson DR, Kurtin PJ, Kumar S, Cerhan JR, Therneau TM, et al. Incidence of al amyloidosis in Olmsted County, Minnesota, 1990 through 2015. Mayo Clin Proc 2019; 94(3): 465–71. [CrossRef]

28. Lim AY, Lee JH, Jung KS, Gwag HB, Kim DH, Kim SJ, et al. Clinical features and outcomes of systemic amyloidosis with gastrointestinal involvement: a single-center experience. Korean J Intern Med 2015; 30(4): 496–505. [CrossRef]