

## RESEARCH ARTICLE

# Prevalence and distribution of colonic diverticular disease from Ordu in Turkey

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Received: 26 September 2019, Accepted: 20 November 2019, Published online: 31 December 2019

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## Abstract

**Objective:** Diverticulosis of the colon is the most frequent anatomical alteration diagnosed at colonoscopy. Most cases of diverticulosis in Western countries involve left side of the colon, while diverticulosis is predominantly present on the right side of the colon in Asian countries. With the aim of this study is to contribute to epidemiologic studies on colonic diverticula in Turkey located in Europe and Asian continent. We analyzed the data of patients undergoing colonoscopy with regard to age, gender, anatomic localization of diverticula retrospectively in the Ordu State Hospital in the Black Sea region.

**Methods:** We retrospectively reviewed a consecutive series of patients with regard to age, gender, location of diverticula and other colonoscopic lesions from an electronic endoscopic database who had undergone colonoscopy at the endoscopy unit of the Ordu State Hospital between 2016 and 2018. If diverticula were observed that distribution type was defined as cecum, ascending colon, transverse colon, descending colon, entire colon and sigmoid colon. In addition, we recorded that the additional diagnoses established in colonoscopic evaluations.

**Results:** We screened 2626 female (51.1%) and 2511 male (48.9%); totally 5137 patients from an electronic endoscopic database who had undergone colonoscopy. 227 (47.4%) female, 252 (52.6%) male, a total of 479 patients who had diverticulosis were included in this study. The mean age was determined female and male  $65.44 \pm 12.01$  (min 31-max 91),  $64.91 \pm 10.97$  (min 27-max 89) respectively and no statistically significant difference between two groups ( $p > 0.05$ ). A total of 479 patients who had diverticulosis were divided into two groups: age  $\leq 50$  (10.4%) and  $50 >$  429 (89.6%). No significant difference was found with regard to diverticulosis localization between two groups ( $p > 0.05$ ). The other colonoscopic diagnoses are as follows; hemorrhoid (40.7%), polyp (40.2%), inflammatory bowel disease (4.7%) colorectal cancer (0.9%), angiodysplasia (2.3%), ulcer (0.9%), anal fissure (1.9%), parasitosis (1.9%), terminal ileitis (0.5%), nonspecific colitis (3.7%), bowel surgery (1.9%) and submucosal lesion (0.5%).

**Conclusion:** Diverticular disease is a worldwide condition that affect elderly people with an increasing incidence in younger patients as well as in developing countries that have started adopting Western diets. So that in the future diverticular disease will induce a significant economic burden in terms of healthcare cost in Turkey. Despite its prevalence, its pathophysiology still remains poorly understood. There is a significant need for more studies to improve our understanding about diverticular disease.

**Key words:** Colonoscopy, colonic diverticular disease, diverticulosis localization.

**Suggested Citation:** Ekmen N, Akalın C. Surgically Prevalence and distribution of colonic diverticular disease from Ordu in Turkey. Middle Black Sea Journal of Health Science, 2019; 5(3): 206-211

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DOI: 10.19127/mbsjohs.622380

### Introduction

The presence of the diverticula in the colon is known as diverticulosis. Diverticulosis is asymptomatic frequently in some patients. However, it can be symptomatic and complicated clinical course (Tursi et al., 2015).

For many years it has been assumed that most cases of diverticulosis were in the Western hemisphere and was due to the absence of fiber intake in the diet (Floch and Bina, 2004), nevertheless, recent studies show that the prevalence of diverticulosis has increased all over the World over the years (Alatise et al., 2012). The prevalence rates of diverticulosis were reported in Western and Asian countries 5-45%, 13-25%, respectively. In Western nations, diverticula primarily involve left-sided in contrast with Asian population, anatomic distribution is predominantly right-sided (Parks, 1969; Ngoi et al., 1992). Diverticulosis is often seen in a population of 70 years old (Painter and Burkitt, 1975). Diverticular disease clinically has been classified into four types; symptomatic complicated by diverticulitis, diverticular bleeding, segmental colitis and symptomatic uncomplicated diverticulitis (Imaeda and Hibi, 2018). Diverticular disease is the cause of a very high gastrointestinal symptom-related hospital admission. Its incidence has been shown to increase over time in both Western and Asian population (Nagata et al., 2014). This increase in the incidence of the disease will become a major of economic burden in terms of healthcare-costs (Imaeda and Hibi, 2018).

In this study, we intended to determine the prevalence and distribution of colonic diverticular disease from Ordu in Turkey.

### Methods

**Design of Study:** This study was a retrospective and single-centre study. We analyzed the database of 5360 patients undergoing colonoscopy from December 2016 to January 2019 in Ordu State Hospital. Indication for colonoscopy were

documented as follow; patients with lower GI complaints, asymptomatic patients with anemia; to screen patients with colorectal cancer in their family history, patients who required to screen for the positive faecal occult blood test, patients who underwent therapeutic endoscopy. We did not include patients with less than 18 years, those whose colonoscopic evaluation was restricted to the rectum, and patients with poorly stool cleaning. We excluded 223 patients who had one or more of the exclusion criteria. Finally, 5137 patients were selected for analysis and 449 patients had colonic diverticula. Diverticula was recorded in electronic endoscopy report according to anatomical localization. Distribution type was defined as the cecum, ascending colon, transverse colon, descending colon, entire colon and sigmoid colon. The information of patients were accessed from an electronic endoscopic database and archive files. The sample size was calculated with the incidence of diverticular disease (10%) and population size (The population of Ordu centre is 750000) and was determined to be 4098 people in 95% confidence interval.

The patients were recommended clear liquid diet two days ago that were given sennoside a + b calcium 500 mg/250 mL (X-M solution®-Yenisehir Laboratory, Turkey) orally and sodium dihydrogen phosphate + disodium hydrogen phosphate (B.T. Enema® 210 mL-Yenisehir Laboratory, Turkey) rectally one day ago colonoscopy. The procedures were performed under general anesthesia with intravenous administration of 0,05 mg/kg midazolam (Midolam, Pharmada pharmacy, Turkey). Colonoscopic evaluation were performed with XQ Olympus (Olympus, Corporation, Tokyo, Japan) endoscopy device by gastroenterology specialist.

This study was approved by the institutional review Clinical Research Ethics Committee of Ordu University.

### Statistical analysis:

All statistical analyses were performed with Statistical Package for Social Science (SPSS) software (IBM SPSS version 24.0 for Windows, Chicago, USA). P value less than 0.05 was considered as statistically significant. Descriptive statistics for continuous variables; mean, standard deviation (SD), minimum and maximum values; expressed as number and percentage for categorical variables. The Mann-Whitney U test was performed for continuous variables. The Pearson's chi-square test was used to determine the correlation between the categorical variables.

**Results**

We screened 2626 female (51.1%) and 2511 male (48.9%); totally 5137 patients from electronic endoscopic reports. Among 227 (47.4%) female, 252 (52.6%) male, a total of 479 patients who had diverticulosis were included in this study. In terms of gender, detection rate of diverticulosis on colonoscopy that was found female and male; 8.6% (n: 227/2699), 10% (n: 252/2511), respectively.

The mean age was determined female and male respectively 65.44±12.01 (min 31-max 91), 64.91±10.97 (min 27-max 89) was no statistically significant difference between in two groups (p>0.05). Table 1 shows the distribution of diverticula on localization.

There was no statistically significant difference between age and localization. (p>0.05). The incidence of diverticular disease in all patients evaluated under 50 years and older. A total of 479 patients who had diverticulosis were divided into two groups: age ≤ 50 (10.4%) and age > 429 (89.6%). No significant difference was found with regard to diverticulosis localization between two groups (p>0.05). Distribution of diverticula on gender and age groups are given in table 2.

Other colonoscopic diagnoses were determined in 214 (44,7%) patients. These diagnoses were shown in table 3.

**Table 1.** The Distribution of Diverticula by Localization

Localization	N	%
Cecum	67	14
Ascending colon	118	24,6
Transverse colon	125	26,1
Descending colon	324	67,6
Sigmoid colon	379	79,1
Entire colon	46	9,6
Total	1059	

N: Number, %: Percent.

**Table 2.** Distribution of Diverticula on Gender and Age Group

Localization	Gender		P value*	Age		P value*
	Female (n=227)	Male (n=252)		≤50 Age, % (n=50)	>50 Age, % (n=429)	
Cecum	33 (49,3%)	34 (50,7%)	0,74	10 (14,9%)	57 (85,1%)	0,20
Ascending colon	57 (48,3%)	61 (51,7%)	0,82	11 (9,3%)	107 (90,7%)	0,65
Transverse colon	59 (47,2%)	66 (52,8%)	0,96	10 (8%)	115 (92%)	0,30
Descending colon	153 (47,2%)	171 (52,8%)	0,92	23 (7,1%)	301 (92,9%)	0,01
Sigmoid colon	172 (45,4%)	207 (54,6%)	0,87	31 (8,2%)	348 (91,8%)	0,02
Entire colon	21 (45,7%)	25 (54,3%)	0,80	4 (8,7%)	42 (91,3%)	0,68

\*: Chi-square test was used. P value of <0.05 was considered statistically significant

**Table 3.** Distribution of the Additional Diagnoses Established in Colonoscopic Examinations.

Diagnosis	N	%
Hemorrhoids	87	40,7
Polyp	86	40,2
Inflammatory bowel disease	10	4,7
Colorectal cancer	2	0,9
Angiodysplasia	5	2,3
Ulcer	2	0,9
Anal fissure	4	1,9
Parasitosis	4	1,9
Terminal ileitis	1	0,5
Nonspecific colitis	8	3,7
Bowel surgery	4	1,9
Submucosal lesion	1	0,5
Total	214	

N: Number, %: Percent.

### Discussion

Diverticulosis of the colon is an anatomical change manifested by pouches in the wall of the colon. Diverticula occurs due to herniated mucosa and submucosa through the defect in the muscular layer of the colon. Impairment colonic motility is the most important preparatory factor in the development of diverticula. The pathophysiology of diverticula includes age, genetic factors, changing colonic motility, lifestyle conditions such as smoking, obesity, alcohol consumption, physical inactivity, fiber and meat intake with diet (Alessandra et al., 2018).

Recent research has indicated a rising in the prevalence of the diverticular disease in the world (Alatise et al., 2012). According to some studies conducted at the beginning of the 20th century; a diverticular disease incidence between 2-10% and 5-20% in patients in developing countries (Painter and Burkitt, 1971). Distribution of diverticular disease by gender tends to change over the years. Previously the diverticular disease was the most common in males. In addition, new studies represent that males under 50 years old have a higher incidence of disease. A study conducted in the United Kingdom showed that the disease is more often in females after the 4th decade (Warner et al., 2007). In some countries prevalence of the disease can be listed as follows: In Western countries 5-45%, in Asia 13-25%, in Lebanon 33%, in the Far East 13-25%, Korea 12% and Taiwan 14% (Painter and Burkitt, 1971, Song et al., 2010; Sharara et al., 2013; Wang et al., 2015).

The diverticular disease is rare in sub-Saharan countries (Baako, 2001). Nigeria declared an incidence as low as 9.4% among patients that undergoing colonoscopic examination (Alatise et al., 2012). The incidence of diverticular disease is low in African countries too. Because African people have limited access to health care (Blachut et al., 2004).

Celebi et al. (2017) divided all patients into two groups as the age of 15-64 years and age of  $\geq 65$  years. The incidence of diverticula was higher in the group over 65 year of age than age of 15-64 years (12.7% vs. 4.5%). However, no statistical difference was found between female and male patients at single center study in Turkey. Additionally, in this study, the frequency of diverticular disease was higher in the patients  $50 \geq$  years old than in those under the age of  $\leq 50$  years old. We also found no difference in the incidence of diverticular disease between female and male patients.

Celebi et al. (2017) presented that %6.8 rate of diverticulosis in patients undergoing colonoscopy. Tamer et al. (2005) reported that diagnoses and rates as follows; hemorrhoid, polyps, ulcerative colitis, diverticula and colorectal cancer; 33.4%, 14.1%, 4.7%, 4.1% and 3.7%, respectively (12). Yilmaz et al. (2006) analyzed retrospectively the data of 322 patients who underwent colonoscopy. They explained that the disease rates as follows: hemorrhoid (17.7%), polyps (14.9%), ulcer (12.4%) and masses (12.4%) and did not report rate of diverticular disease. In our study, 40.7% hemorrhoid and diverticulosis 9.3% were detected

and these rates are higher than Tamer et al. (2005) and Celebi et al. (2017). The total number of patients in the four different studies as follows; 2069 (Tamer et al., 2005), 322 (Yilmaz et al., 2006), 2831 (Celebi et al., 2017), and 5137 (our study).

Anatomical localization of the diverticula varies by race and geography. Diverticula are located only sigmoid colon in 65% of patients, in 24% of patients mainly located in the sigmoid colon, and in %7 of patients' diverticula involve entire colon in the Western and industrialized population (Parks, 1969). The Asian population, diverticula principally involves the right colon with a rate of approximately %13 to %25 (Ngoi et al., 1992). In our population, distribution of diverticula; cecum 14%, ascending colon 24.6%, transverse colon 21.65%, descending colon 67.6%, sigmoid 79.1%, entire colon 9.6% that reflected both Western and Asian population.

With the increasing incidence of diverticular disease continues to be a burden in terms of health care costs in Western and Asian countries (Imaeda and Hibi, 2018). According to our predict that the incidence of diverticular disease will increase because of rising elderly population over the years in Turkey. At the same time, the transition of a Western type lifestyle lead to an increase in diverticulosis incidence in youth patients. There are two important complications in diverticular disease: diverticulitis and diverticular bleeding. Diverticular bleeding occurs 5 to 15 percent among all patients. In 4 to 15 percent of patients with diverticular disease may develop diverticulitis (Imbembo and Bailey, 1992).

About 200000 patients have been admitted to the hospital each year due to symptoms related to diverticular disease in the United States (Peery et al., 2015). Delvaux (2003) reported that there were almost 800000 hospital admissions for diverticular disease in European countries. So that in the future diverticular disease will be a significant healthcare problem in Turkey. We need to know the true prevalence to reduce mortality and morbidity associated with diverticular disease. The number of large-scale studies should be increasing all over the world. Prevalence of diverticulosis has been estimated prospectively in several colonoscopy-based studies in Asia. We can show the biggest deficiencies in our study as follows: unrecorded patient symptoms in the evaluation and the absence of out-hospital follow-up of the patients and this study was retrospective. We think that there is a need for multicentric epidemiological studies on this subject in Turkey.

### Conclusion

Diverticular disease affects especially the elderly population in worldwide. However, new studies have begun to show an increased incidence in the young population. The most important reason for this is the developing countries that have started transition Western diets. Despite the rapid increase in the prevalence of the disease, its pathophysiology remains unresolved. Diverticular disease should be considered as a major burden of health-care cost for all over the world. There is a need for new studies to reduce the prevalence of diverticular disease.

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**Ethics Committee Approval:** Ethics committee approval was received for this study from Clinical Research Ethics Committee of Ordu University.

**Peer-review:** Externally peer-reviewed.

**Author Contributions** Concept- N. E., Ç. A., Design- N.E., Ç. A., Supervision- N. E., Ç. A., Literature Review- N. E., Writing- N. E., Ç. A., Critical Review- N. E., Ç. A.

**Conflict of Interest:** No conflict of interest was declared by the author.

**Financial Disclosure:** The authors declared that this study hasn't received no financial support.

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