

Original Research Article

Diverticular disease of the colon in Israel: deference between Arabs and Jewish's populations

Mahmud Mahamid^{1,2,3*}, Amir Mari⁴, Ali Taha¹, Shadi Maoed¹ and Omar Abu-Elhija^{1,2}

Abstract

¹Internal Medicine Department, Holy Family Hospital, Nazareth, Israel

²Faculty of Medicine in the Galilee, Bar-Ilan University, Safed, Israel

³Digestive disease institute, Shaare Zedeq Medical Center, Jerusalem, Israel

⁴Hill Yafe, Medical Center, Hadera, Israel

*Corresponding Author's E-mail: mahmudmahamid@yahoo.com
Tel-+97246028851
Fax-+972747559051

The data regarding prevalence and clinical characteristics of DDC among Israeli Arabs are confusing. The aim was to investigate the prevalence and clinical feature of DDC among Israelis Arabs in compression with Israeli Jewish's in a retrospective cohort observational study. All subjects who underwent screening colonoscopy within two years were included. Data were extracted from the patient charts included demographic, anthropometric measurement, underlying diseases, and data regarding the diverticular disease including: location, size, number, and distribution pattern. Overall 3782 screening colonoscopies were performed between April 2014 and April 2016, 474 cases with DDC were diagnosed (12.5%). The prevalence was 8.1% among Arabs and 21.5% among Jewish (P<0.05). The mean age of Arabs was 72.5 ± 5.2 versus 67.1.5 ± 9.5 among Jewish (P<0.001), active smoking was reported in 46.5% among Arabs vs 26% among Jewish (P0.001), pan-diverticulosis was more common among Arabs 42% vs 27% (P0.046), in both groups the disease was male predominant 74% vs 65% (P0.016). From the logistic regression analysis, older age >60 (OR 2.14; 95% CI, 1.71-2.93), male sex (OR 1.59; 95% CI, 1.02-2.68), current smoking (OR 2.07; 95% CI, 2.17-2.79), diabetes mellitus (OR 1.67; 95% CI, 1.51-1.76), dyslipidemia (OR 1.52; 95% CI, 1.15-1.82), BMI >23kg/m² (OR 1.23; 95% CI, 1.05-1.72), hypothyroidism (OR 1.62; 95% CI, 1.13-1.56) and hypertension (OR 1.43; 95% CI, 1.02-2.68) were associated with increased risk for HP. The prevalence of DDC among Israeli Arabs is low compared with Jewish populations leaving in Israel. The Arabs DDC patients seem to be older and the DDC tend to be diffuse (pandiverticulosis).

Keywords: Divericulosis, epidemiology, Israeli Arabs, Jewish's

INTRODUCTION

Historically, description and investigation of Diverticular Disease of the Colon (DDC) are relatively modern phenomenon.

The epidemiology of DDC has changed markedly since its description in the 19th and early 20th centuries. Clinical reports during this time were uncommon¹. At present, DDC is consider one of the most common GI tract disorders, and tends suggest an increase incidence of associated complications and health care cost (Campbell et al., 2002; Floch and White, 2006).

Because most persons with DDC are asymptomatic and may never be identified, the true incidence and prevalence are still not known (Kang et al., 2003; Etzioni et al., 2009).

Risk of DDC are, alcohol, aspirin and NSAIDs use, diet high in red meat, genetics factors, increase age, low fiber diet, obesity, smoking, and residence in Western countries (Kang et al., 2003; The incidence of colonic diverticulosis in Finland and Sweden (1963).

Tow features dominate the epidemiologic profile of

DDC: geography and age; prevalence clearly increases with age and DDC has long been considered a disease of Western civilization. Geography seems to be an anatomic determinant of where DDC are found within the colon; in Western countries the DDC is left sided predominant in contrast, individuals from Asia tend to have right-sided predominance DDC (Kang et al., 2003; The incidence of colonic diverticulosis in Finland and Sweden (1963).

Recent evidence showed a rising prevalence of DDC in Europe, the United States and Canada (Stollman and Raskin, 1999).

DDC is rare in rural Asia and Africa; moreover, an even lower prevalence of DDC was reported in Sub-Saharan Africa with slightly younger age with right colon involvement in two thirds of cases (Madiba and Mokoena, 1994).

Data regarding DDC from the Arab world is lacking; a retrospective single center study from Jordan, DDC was found in 4% (Fatayer et al., 1983). A higher prevalence was reported in Israel, reaching 9.5% among Arabs, with seven-fold increase over a 10-years period (Levy et al., 1985).

The data regarding incidence, prevalence, epidemiology, and clinical characteristics of DDC among Israeli Arabs are confusing. Moreover, the similarity and difference from that in other Israeli populations is not clear.

The aim of our study is to investigate the prevalence, location, distribution, clinical feature, complications and possible associations of DDC among Israeli Arabs in comparison with Israeli Jewish's.

METHODS

A retrospective cohort observational study that was conducted at Division of Internal Medicine of the Holy Family Hospital, Nazareth, Israel between April 2014 and April 2016 on patients who underwent screening colonoscopy.

The study was approved by the local ethics committee. The data were coded to keep anonymity of the patients; informed consent was waived because of the non-interventional study design.

Patient selection and data collection: the study population of this study consisted of adult Israeli Arabs patients with DDC diagnosed during screening colonoscopy, who were follow-up at the Holy Family Hospital (HFH), and who were sent to screening colonoscopy in the past two years.

The control group consisted with DCC Jewish's patients age-sex match patients. Exclusion criteria included: patients with known history of asymptomatic or symptomatic DDC, patients with known colonic disease including inflammatory bowel disease and polyposis syndrome, patients with history of total or

segmental colectomy, patients with family or personal history of colonic cancer or colonic polyps.

Data were obtained from the medical charts of all enrolled patients and from family physician in case there is a need for any missing data for study purposes.

The following information was extracted from patient's charts: demographic, anthropometric measurement, vital signs, underlying diseases, medical therapy, laboratory data, and the body mass index (BMI) for all patients was calculated in kg/m^2 .

Colonoscopy: each patient underwent colonoscopy after completing a bowel preparation with 4 liter polyethylene glycol lavage solution; colonoscopies were performed by one of the five staff gastroenterologists at HFH; each colonoscopy report was examined for the presence of DDC, Diverticulosis location, size, number, and distribution pattern of the DDC, location was divided into cecum, ascending, hepatic flexure, and proximal transverse colon was defined as right sided DDC. DDC located in distal transverse colon, splenic flexure, descending, and sigmoid was defined as left sided DDC, if the DDC was located in most part of the colon was defined as pan-diverticulosis.

Statistical analysis: Data were analyzed using SPSS version 19 (IBM SPSS, Chicago, IL, USA). Continuous variables are expressed as the mean \pm standard deviation. The Chi-square test was used to test differences in categorical variables between the cases and controls, and analysis of variance (ANOVA) or the Student's *t*-test was used for comparisons of continuous variables. Spearman rank correlation and univariate regression analysis were used to determine the strength of the relationship between both groups after adjusting for independent variables previously known to be associated with DDC, namely age, gender, BMI, diabetes mellitus. A multiple logistic regression analysis was done to determine the association between the different risk factors for DDC. A significance level of <0.05 was used in this test.

RESULTS

Overall 3782 screening colonoscopies were performed between April 2014 and April 2016, 474 cases with DDC were diagnosed (12.5%).

From all screening colonoscopies 2542 were performed to Israeli Arabs from which 207 patients were diagnosed with DDC (8.1%). 1240 screening colonoscopies were performed to Israeli Jewish's with 264 patients diagnosed with DDC (21.5%).

Overall to compare the characteristics of DDC between Israeli Arabs and Jewish groups we analyzed the data of 200 Israeli Arabs and 100 Israeli Jewish.

Table 1 summarizes the clinical feature and characteristics of the two groups.

Table 1. Demographic, clinical data comparing both study groups

Characteristic	Arabs n = 200 (%)	Jewish's n = 100 (%)	p-Value
Age (years)	72.5 ± 5.2	67.1 ± 9.5	<0.001
Male sex	145 (74%)	65 (65%)	0.016
BMI (kg/m ²)	24.3 ± 6.7	23.7 ± 5.9	0.330
Current smoking	93 (46.5%)	26 (26%)	0.001
Pan-diverticulosis	84 (42%)	27 (27%)	0.046
Left sided DDC	38 (19%)	18 (18%)	0.958
Right sided DDC	7 (14%)	9 (9%)	0.572
Large DDC>5mm	7 (3.5%)	5 (5%)	0.685
Hypertension	156 (59%)	70 (70%)	0.06
hyperlipidemia	118 (40%)	38 (38%)	0.063
Diabetes mellitus	98 (49%)	40 (40%)	0.140
Hypothyroidism	5 (2.5%)	14(14%)	0.001

BMI= body mass index, DDC=Diverticular Disease of the Colon

Table 2. Multivariate analysis for the risk for DDC by gender, age, smoking, hypertension, BMI and diabetes mellitus.

Variable	OR (95% CI)	p-Value
Male gender	1.59 (1. 02–1.68)	<0.001
Age >60	2.14 (1. 71–2.93)	0.003
Current smoking	2.07 (2.17–2.79)	0.027
Diabetes mellitus	1.67 (1.51–1.76)	0.001
Hypertension	1.43 (1.15–1.82)	0.022
Dyslipidemia	1.52 (1.26–1.78)	<0.001
Hypothyroidism	1.62 (1.13–1.56)	<0.001
BMI> 23 kg/m ²	1.23 (1.05–1.72)	0.004

OR= odds ratio; CI= confidence interval; DCC= Diverticular Disease of the Colon; BMI= body mass index.

Among the Arabs group: the mean age was 72.5 ± 5.2, 145 patients (73.9%) were males; the mean body mass index was 24.3 +6.7; patients with current smoking were 93 patients (46.5%).

Regarding the distribution pattern of the DDC among the Arabs group in 84 patients (42%) the DCC was diffused and Pandiverticulosis, 14 patients (7%) had right sided diverticulosis, 38 patients (19%) had left sided diverticulosis' and 64 patients (32%) had isolated DDC to the sigmoid colon.

94 patients (47%) had mild DDC, and 106 (53%) had severe multiple DCC. Regarding the size of diverticulosis 193 patients (96.5%) had small size DDC (<5mm), and 7 (3.5%) had large diverticulosis (mostly > 5mm).

Among the Jewish's group: the mean age was 67.1 ± 9.5, 65 patients (65%) were males; the mean body mass index was 23.7+5.9, patients with current smoking were 26 patients (26%).

Regarding the distribution pattern of the DDC in 27 patients (27%) the DCC was diffused and Pandiverticulosis, 9 patients (9%) had right sided, 18

patients (18%) had left sided diverticulosis' and 46 patients(46%) had isolated DDC to the sigmoid colon.

58 patients (58%) had mild DDC, and 42 (42%) had severe multiple DDC. Regarding the size of diverticulosis 95 patients (95%) had small size DDC (<5mm), and 5 (5%) had large diverticulosis (mostly > 5mm).

The multivariate analysis of the risk for DDC is shown in table 2. From the logistic regression analysis, older age >60 (OR 2.14; 95% CI, 1.71-2.93), male sex(OR 1.59; 95% CI, 1.02-2.68), current smoking(OR 2.07; 95% CI, 2.17-2.79), diabetes mellitus(OR 1.67; 95% CI, 1.51-1.76), dyslipidemia (OR 1.52; 95% CI, 1.15-1.82), BMI >23kg/m²(OR 1.23; 95% CI, 1.05-1.72), hypothyroidism (OR 1.62; 95% CI, 1.13-1.56) and hypertension(OR 1.43; 95% CI, 1.02-2.68) were associated with increased risk for HP (table 2).

DISCUSSION

DDC is a common gastrointestinal disorder in Western

population and less common in Eastern countries. The true prevalence of DDC in the general population is difficult given that most affected subjects will remain asymptomatic (Campbell et al., 2002; Floch and White, 2006).

The epidemiology of DDC has changed markedly since its description in the 19th and early 20th centuries; clinical reports during this time were uncommon, and autopsy studies were used to estimate prevalence. At present DDC is considered one of the most common GI disorders and trends suggest an increase in incidence of associated complications and health care costs (Floch and White, 2006).

Medical literature suggests that approximately two thirds of adults will develop it by their ninth decade of life. The increasing use of colonoscopy further supports this notion and has helped refine our understanding of its prevalence (Chia et al., 1991).

A higher prevalence of DDC was reported in Israel, reaching 9.5% among Arabs, with seven-fold increase over a 10-year period. The data about DDC among Arabs in general, and Arabs living in Israel are limited (Levy et al., 1985).

The result of this study showed that the prevalence of DDC in the general population in Israel is 12.5%. Among Israeli Jews the prevalence of the disease was significantly higher (21.5%) compared with Israeli Arabs (8.1%). The prevalence of DDC among Israeli Arabs is low compared with western countries and Jewish populations living in Israel but still slightly higher compared with data from other countries in the Arab world.

The mean age of the Israeli Arab patients with DDC was 72.5 ± 5.2 , significantly older than the Jewish population where the mean age was 67.1 ± 9.5 , the majority of patients in both groups (95.6%) were older than 50 years of age; the disease was more prevalent in advancing age, which is in agreement with the international literature.

Our results confirm the male-predominant theory of the disease reported in the literature as the majority of subjects with DDC from both groups were males, 73.9% among Arabs and 65% among Jews with DDC (Chia et al., 1991).

The distribution pattern of the DDC differs between the two study groups; as the majority of Arabs (42%) has pan-diverticulosis compared with only 27% from the Jewish patients who have diverticulosis. The dominant distribution pattern among the Jewish population was the left-sided DDC. Overall the majority of subjects from both study groups have left-sided DDC which is most likely due to urbanization with the increased consumption of red meat and low fiber diet (Burkitt et al., 1972).

The right colon DCC pattern which is commonly affected in Asia was rare among both study groups, only 7% from Arabs and 9% from Jews had this distribution pattern (Beranbaum et al., 1972).

Previously published studies have demonstrated a clear association between DDC and hypertension, diabetes mellitus, obesity, smoking, older age and male sex (Niikura et al., 2012; Yamada et al., 2008). Our data showed similar association between the classical risk factors mentioned before and DDC. Interestingly, hypothyroidism was associated with DDC particularly among Jewish populations.

Our study had several limitations; the retrospective design of the study makes it difficult to infer causality between DDC and the classical risk factors for the disease. Second, there may have been a selection bias, as subjects were recruited from patients who visit a single center (HFH) for screening colonoscopy. Third, the population size was too small to accurately reflect some known risk factors to be associated with HP as red meat and low fiber diet and family history.

CONCLUSION

This study showed that the prevalence of DDC among Israeli Arabs is low compared with Jewish populations living in Israel. The Arab DDC patients seem to be older and the DDC tends to be diffuse (diverticulosis). The most important risk factor associated with DDC appears to be advanced age and smoking. More future prospective studies with large cohorts to elucidate the true prevalence, behavior, risk factors and association of DDC in Israeli Arab populations.

REFERENCES

- Beranbaum SL, Zausner J, Lane B (1972). Diverticular disease of the right colon. *Am J Roentgenol Radium Ther Nucl Med.* ;115:334-348.
- Burkitt DP, Walker AR, Painter NS (1972). Effect of dietary fibre on stools and the transit-times, and its role in the causation of disease. *Lancet.* ;2:1408-1412.
- Campbell WB, Lee EJ, Van de Sijpe K, Gooding J, Cooper MJ (2002). A 25-year study of emergency surgical admissions. *Ann R Coll Surg Engl.* ;84:273-277.
- Chia JG, Wilde CC, Ngoi SS, Goh PM, Ong CL (1991). Trends of diverticular disease of the large bowel in a newly developed country. *Dis Colon Rectum.* ;34:498-501.
- Chia JG, Wilde CC, Ngoi SS, Goh PM, Ong CL (1991). Trends of diverticular disease of the large bowel in a newly developed country. *Dis Colon Rectum.* ;34:498-501.
- Etzioni DA, Mack TM, Beart RW, Kaiser AM (2009). Diverticulitis in the United States: 1998-2005: changing patterns of disease and treatment. *Ann Surg.* ;249:210-217.
- Fatayer WT, A-Khalaf MM, Shalan KA, Toukan AU, Daker MR, Arnaout MA (1983). Diverticular disease of the colon in Jordan. *Dis Colon Rectum.* ;26:247-249.
- Floch MH, White JA (2006). Management of diverticular disease is changing. *World J Gastroenterol.* ;12:3225-3228.
- Kang JY, Hoare J, Tinto A, Subramanian S, Ellis C, Majeed A, Melville D, Maxwell JD (2003). Diverticular disease of the colon--on the rise: a study of hospital admissions in England between 1989/1990 and 1999/2000. *Aliment Pharmacol Ther.* ;17:1189-1195.
- Kang JY, Hoare J, Tinto A, Subramanian S, Ellis C, Majeed A, Melville D, Maxwell JD (2003). Diverticular disease of the colon--on the rise: a study of hospital admissions in England between 1989/1990 and 1999/2000. *Aliment Pharmacol Ther.* ;17:1189-1195.

- Levy N, Stermer E, Simon J (1985). The changing epidemiology of diverticular disease in Israel. *Dis Colon Rectum.* ;28:416-418
- Madiba TE, Mokoena T (1994). Pattern of diverticular disease among Africans. *East Afr Med J.* ;71:644-646
- Niikura R, Nagata N, Akiyama J, Shimbo T, Uemura N (2012). Hypertension and concomitant arteriosclerotic diseases are risk factors for colonic diverticular bleeding: a case-control study. *Int J Colorectal Dis.* ;27:1137-1143.
- Stollman NH, Raskin JB (1999). Diagnosis and management of diverticular disease of the colon in adults. Ad Hoc Practice Parameters Committee of the American College of Gastroenterology. *Am J Gastroenterol.* ;94:3110-3121.
- The incidence of colonic diverticulosis in Finland and Sweden (1963). *ActaChir Scand.* ;126:148-155.
- Yamada A, Sugimoto T, Kondo S, Ohta M, Watabe H, Maeda S, Togo G, Yamaji Y, Ogura K, Okamoto M (2008). Assessment of the risk factors for colonic diverticular hemorrhage. *Dis Colon Rectum.*; 51:116-120