

EPIDEMIOLOGY

Prevalence of Inflammatory Bowel Disease in an Insured Population in Puerto Rico During 1996

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Objectives. Limited data exists about Inflammatory Bowel Disease (IBD) in Hispanic populations. The aims of the present study were to estimate overall and specific prevalence of IBD (Crohn's disease and ulcerative colitis) and to describe the characteristics of a group of patients from the University of Puerto Rico's IBD Registry.

Methods. To estimate the prevalence of IBD, computerized records of all physician billing and hospital discharges from a major health insurer in Puerto Rico and classified with ICD-9-CM codes 555.0-555.9 (Crohn's disease) and 556.0-556.9 (ulcerative colitis) during 1996 were searched. Prevalence was estimated by age group, sex, and type of insurance. To describe demographic and selected clinical information from patients with IBD, data gathered in the University of Puerto Rico's IBD Registry from 1995 through 2000 was analyzed.

Results. Out of 802,726 insured individuals, 332 had a diagnosis of Crohn's disease, 499 of ulcerative colitis and 21 had both diagnoses. The estimated prevalence per 100,000 was 41.4 for Crohn's disease, 62.2 for ulcerative colitis, and 106.1 cases per 100,000 for IBD. Peak prevalence of Crohn's disease occurred among the age groups 50-59 years and ≥ 60 years, and the overall

female:male prevalence ratio of Crohn's disease was 1.13 (95% CI: 0.91-1.42). Ulcerative colitis was most prevalent among insured individuals aged 50-59 years and 40-49 years. The prevalence of ulcerative colitis was significantly higher among females than among males, with an overall prevalence ratio of 1.42 (95% CI: 1.18-1.71). Of 342 patients participating in the IBD Registry, 155 (45.3%) had Crohn's disease and 187 (54.7%) had ulcerative colitis. Among patients diagnosed with Crohn's disease, 51.6% were females, the mean age was 35.2 ± 18.3 years, and 18.1% had a family history of IBD. More than half (57.8%) of patients with ulcerative colitis were females, the mean age was 42.6 ± 17 years, and 17.1% had a family history of IBD.

Conclusions. The estimated prevalence of IBD in this insured population in Puerto Rico places it among the middle-range of that reported for other countries. Additional studies must be conducted in Puerto Rico in order to confirm the observed findings. Population-based epidemiologic studies aimed at estimating the burden of IBD in Hispanic populations in the United States and Latin America are essential for health care planning.

Key words: Inflammatory bowel disease, Prevalence, Puerto Rico.

The inflammatory bowel diseases (IBD), Crohn's disease and ulcerative colitis, are chronic idiopathic disorders of the gastrointestinal tract. In addition to the interaction between genetic and environmental factors in the pathogenesis of IBD, microorganisms have been discussed as possibly playing

an important role (1-4). IBD has been reported to be more prevalent in industrialized countries. Patients are more commonly Northern Europeans, Anglo-Saxons or Northern Eastern Europeans. Urban dwellers seem to be more affected than those of rural areas, and Caucasians more than other races (5). Limited data exists about IBD in Hispanics, the fastest-growing minority population in the United States.

The rate of admissions with a diagnosis of either Crohn's disease or ulcerative colitis to the Puerto Rico Medical Center has increased from 7 patients/10,000 admissions in 1990 to 16/10,000 in 1994. This increase cannot be ascribed to improved awareness and better diagnosis, since there were no significant changes in either the gastroenterology staff or the diagnostic methods during this period. Neither the composition of the population receiving services in the

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Puerto Rico Medical Center nor the size or capacity of the facilities changed over this time period.

The objectives of this study were two-fold: to estimate the overall and specific prevalence of Crohn's disease and ulcerative colitis in an insured population in Puerto Rico, and to describe the characteristics of a group of patients from the University of Puerto Rico's IBD Registry.

Methods

Prevalence study. Triple S is the major health insurer in Puerto Rico, offering pre-paid health insurance and a government sponsored managed care plan for the low-income population that previously received services from the Health Department. In 1996, Triple S had 802,728 covered lives all over the island, including 468,423 (58.4%) privately covered and 334,305 (41.6%) under managed care. This represents approximately 23% of the total population of Puerto Rico, estimated as 3.5 million in the 1990 census, and over 3.8 million in the 2000 census. Triple-S insures a representation of the general population of Puerto Rico across all geographic and socioeconomic groups.

Computerized records of all physician billing claims and hospital discharges classified with ICD-9-CM codes 555.0-555.9 (Crohn's disease) and 556.0-556.9 (ulcerative colitis) from January 1 to December 31, 1996 were searched. Any physician claim or hospital discharge abstract was extracted into a separate file for further analysis. There were 852 individuals with at least one medical contact with a diagnosis of Crohn's disease or ulcerative colitis during 1996. Of these, 21 (2.5%) had an indeterminate diagnosis and were excluded from the prevalence estimation analysis. Because of contractual privacy clauses, the medical records were not available for review and confirmation of the diagnosis. The annual prevalence of Crohn's disease and ulcerative colitis per 100,000, computed using the mid-year insured population in 1996 as the denominator, were defined as follows:

$$\text{Prevalence}_{\text{Ulcerative Colitis}} = \frac{\text{Number of cases with medical claims coded as 556.0 - 556.9}}{\text{Number of insureds in July 1, 1996}} \cdot 100,000$$

$$\text{Prevalence}_{\text{Crohn's Disease}} = \frac{\text{Number of cases with medical claims coded as 555.0 - 555.9}}{\text{Number of insureds in July 1, 1996}} \cdot 100,000$$

Prevalence was estimated with 95% confidence (95% CI) using Poisson exact methods². Specific prevalences of Crohn's disease and ulcerative colitis were computed by age group, sex, and type of insurance (government vs. private). Prevalence ratios (PR) were also estimated with 95% confidence using Poisson exact methods (6). All estimations were performed using Stata version 7 (Stata Corporation, College Station, Texas).

IBD Research Registry. In 1995, a registry of IBD was designed at the University of Puerto Rico Medical Sciences Campus for the purpose of collecting demographics, lifestyles and clinical data from patients with Crohn's disease and ulcerative colitis diagnosed in Puerto Rico. Diagnosis was established by the primary gastroenterologist using standard radiographic, endoscopic and histologic criteria. The questionnaire included patients' date of birth, gender, education level, family income, place of birth, diagnosis, age at onset, family history, extent of disease, complications, extraintestinal manifestations, medications, history of blood transfusions and surgery. When necessary, the medical records were reviewed for confirmation of the medical information. The Institutional Review Board of the Medical Sciences Campus approved the protocol and informed consent was obtained from all subjects. A trained gastroenterology fellow administered the questionnaire in person or over the telephone. Subjects were recruited from the IBD Clinic of the University Hospital, the local chapter of the Crohn's and Colitis Foundation of America (CCFA), private practices and through newspaper ads.

Results

Prevalence data. The overall annual prevalence per 100,000 was 106.1 (95% CI: 99.1/100,000-113.5/100,000) for IBD, 41.4 (95% CI: 37.0/100,000-46.1/100,000) for Crohn's disease, and 62.2 (95% CI: 56.9/100,000-67.9/100,000) for ulcerative colitis (Figure 1).

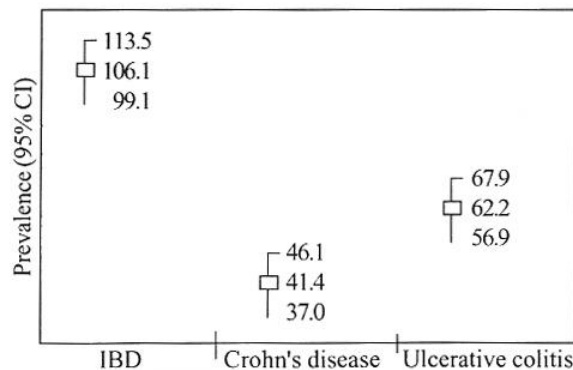


Figure 1. Prevalence per 100,000 of IBD in an insured population in Puerto Rico, 1996

The peak prevalence of Crohn's disease occurred among the age groups 50-59 (50.2/100,000) and ≥60 years (51.5/100,000) (Table 1). The prevalence of Crohn's disease in males was highest for oldest individuals (≥60 years) (60.0/100,000) and those aged 30-39 years (55.4/100,000); however, the prevalence in females was highest among

those aged 50-59 and 40-49 years (66.5/100,000 and 52.7/100,000, respectively). The overall female:male prevalence ratio of Crohn's disease was 1.13 (95% CI: 0.91-1.42), thus, the prevalence was similar in both sexes. However, females had a significantly ($p < 0.05$) larger prevalence of Crohn's disease in the age groups 40-49 years (PR=3.76; 95% CI: 1.63-10.10) and 50-59 years (PR=2.20; 95% CI: 1.10-4.69).

Ulcerative colitis was most prevalent among insured individuals aged 50-59 years and 40-49 years (95.8/100,000 and 95.7/100,000, respectively) (Table 1). As with Crohn's disease, the prevalence of ulcerative colitis in males was highest for oldest individuals (≥ 60 years) (90.0/100,000) and those aged 30-39 years (84.1/100,000), and the prevalence in females was highest among those aged 40-49 years and 50-59 years (118.5/100,000 and 131.0/100,000, respectively). The prevalence of ulcerative colitis was significantly higher among females than among males, with an overall prevalence ratio of 1.42 (95% CI: 1.18-1.71). Similar to Crohn's disease, females had a substantially larger prevalence of Crohn's disease in the age groups 40-49 years (PR=1.74; 95% CI: 1.14-2.70) and 50-59 years (PR=2.47; 95% CI: 1.49-4.27).

95% CI: 2.07-4.39). For ulcerative colitis, the prevalence was nearly three times (PR=2.98, 95% CI: 2.07-4.39) higher among privately insured individuals than among government paid insured individuals. This prevalence ratio was significantly greater than one in age groups 20-29 years (PR=3.36, 95% CI: 1.47-8.98), 30-39 years (PR=3.95, 95% CI: 1.56-12.85) and ≥ 60 years (PR=4.06, 95% CI: 1.92-9.34).

The prevalence of Crohn's disease was significantly higher among privately insured females than among government paid insured females, with an overall prevalence of 2.31 (95% CI: 1.64-3.32) (Table 3). This prevalence ratio was significantly greater than one for age groups 40-49 years (PR=3.45, 95% CI: 1.21-13.55) and ≥ 60 years (PR=15.52, 95% CI: 3.79-135.54). For ulcerative colitis, the prevalence was 3.35 (95% CI: 2.49-4.59) times higher among privately insured females than among government paid insured females. This prevalence ratio was significantly higher in age groups 30-39 years (PR=3.71, 95% CI: 1.68-9.69), 40-49 years (PR=3.45, 95% CI: 1.71-7.90), 50-59 years (PR=4.43, 95% CI: 2.10-10.76) and ≥ 60 years (PR=4.21, 95% CI: 2.19-8.63).

IBD Research Registry.

From 1995 to 2000, 342 volunteers were recruited from the IBD Clinics, CCFA meetings and the community. Of these, 155 (45.3%) had Crohn's disease and 187 (54.7%) had ulcerative colitis. Among patients diagnosed with Crohn's disease, 51.6% were females with a mean age of 35.2 ± 18.3 years. The mean age at disease onset was 29.4 ± 13.3 years, and 18.1% had a family history of IBD. Sixty-three percent lived in urban areas, and 60.4% had more than 12 years of education. Forty-seven percent reported a childhood family monthly income below \$800.00, whereas 36.7% had a current family income at that level. More than half (57.8%) of patients with ulcerative colitis were females with a mean age of 42.6 ± 17 years.

The mean age at disease onset was 33.2 ± 16 years, and 17.1% had a family history of IBD. More than half (61.2%) were living in urban zones, and 50.8% had more than 12 years of education. Nearly 67% reported a childhood family income less than \$800 per month, whereas 43.2% had a current income at that level.

Table 1. Prevalence per 100,000 of Crohn's disease* and ulcerative colitis† by age and sex in an insured population in Puerto Rico, 1996

Age in years	Females		Males		Female:Male		Both sexes	
	Cases	Prevalence	Cases	Prevalence	Prevalence Ratio	95% CI	Cases	Prevalence
Crohn's disease								
≤ 19	46	33.4	45	31.4	1.06	0.69-1.64	91	32.3
20-29	28	45.9	27	54.9	0.84	0.48-1.48	55	49.9
30-39	25	38.3	29	55.4	0.69	0.39-1.22	54	45.9
40-49	32	52.7	7	14.0	3.76	1.63-10.10	39	35.2
50-59	32	66.5	12	30.3	2.20	1.10-4.69	44	50.2
≥ 60	23	44.4	26	60.0	0.74	0.40-1.35	49	51.5
Total	186	43.8	146	38.6	1.13	0.91-1.42	332	41.4
Ulcerative colitis								
≤ 19	14	10.2	13	9.1	1.12	0.49-2.59	27	9.6
20-29	50	82.0	41	83.3	0.98	0.64-1.53	91	82.6
30-39	58	88.9	44	84.1	1.06	0.70-1.60	102	86.8
40-49	72	118.5	34	68.0	1.74	1.14-2.70	106	95.7
50-59	63	131.0	21	53.0	2.47	1.49-4.27	84	95.8
≥ 60	50	96.5	39	90.0	1.07	0.69-1.67	89	93.6
Total	307	72.3	192	50.8	1.42	1.18-1.71	499	62.2

*ICD-9: 555.0-555.9
†ICD-9: 556.0 - 556.9

The prevalence of Crohn's disease was significantly higher among privately insured males than among government paid insured males, with an overall prevalence of 1.50 (95% CI: 1.05-2.17) (Table 2). The prevalence was significantly ($p < 0.05$) greater for the private sector than the public sector for males aged less than 19 years (PR=2.98,

Table 2. Prevalence per 100,000 of Crohn's disease* and ulcerative colitis† by type of insurance in an insured male population in Puerto Rico, 1996

Age in years	Private		Government paid		Private:Government paid	
	Cases	Prevalence	Cases	Prevalence	Prevalence Ratio	95% CI
Crohn's disease						
≤19	33	40.8	12	19.2	2.12	1.07-4.52
20-29	17	58.4	10	49.7	1.18	0.51-2.87
30-39	19	54.7	10	56.8	0.96	0.43-2.32
40-49	4	11.9	3	18.2	0.65	0.11-4.47
50-59	11	44.9	1	6.6	6.78	0.99-291.67
≥60	15	83.1	11	43.5	1.91	0.82-4.59
Total	99	44.8	47	29.9	1.50	1.05-2.17
Ulcerative colitis						
≤19	9	11.1	4	6.4	1.74	0.49-7.73
20-29	34	116.9	7	34.8	3.36	1.47-8.98
30-39	39	112.3	5	28.4	3.95	1.56-12.85
40-49	27	80.5	7	42.5	1.89	0.80-5.15
50-59	17	69.3	4	26.5	2.62	0.85-10.70
≥60	29	160.6	10	39.6	4.06	1.92-9.34
Total	155	70.2	37	23.5	2.98	2.07-4.39

Table 3. Prevalence per 100,000 of Crohn's disease* and ulcerative colitis† among females by type of insurance in a female insured population in Puerto Rico, 1996

Age in years	Private		Government paid		Private: Government paid	
	Cases	Prevalence	Cases	Prevalence	Prevalence Ratio	95% CI
Crohn's disease						
≤19	31	39.9	15	24.9	1.60	0.84-3.19
20-29	20	55.9	8	31.8	1.76	0.74-4.61
30-39	17	39.3	8	36.3	1.08	0.44-2.90
40-49	28	68.8	4	19.9	3.45	1.21-13.55
50-59	25	85.4	7	37.2	2.30	0.97-6.29
≥60	21	100.5	2	6.5	15.52	3.79-136.54
Total	142	57.4	44	24.8	2.31	1.64-3.32
Ulcerative colitis						
≤19	11	14.2	3	5.0	2.84	0.75-15.86
20-29	36	100.6	14	55.6	1.81	0.95-3.63
30-39	51	118.0	7	31.8	3.71	1.68-9.69
40-49	63	154.8	9	44.8	3.45	1.71-7.90
50-59	55	188.0	8	42.5	4.43	2.10-10.76
≥60	37	177.0	13	42.1	4.21	2.19-8.63
Total	253	102.2	54	30.5	3.35	2.49-4.59

Discussion

IBD has been reported to be more frequent in industrialized countries and among Caucasian populations,

especially those of Northern European origin (1). Little data exists regarding the incidence or prevalence of these conditions among Hispanics. Brullet and colleagues estimated the incidence of IBD in four areas of Spain, finding it to be 2 to 6 times higher than that previously reported, although they could not determine whether this was a true increase in incidence or a result of the study methodology (7). The incidence of ulcerative colitis was significantly lower than Northern Europe, but that of Crohn's disease was found to be between that of Northern and Southern Europe. Linares de la Cal and collaborators surveyed two communities in Panama and in Argentina to estimate the mean annual incidence of IBD during a seven-year period (8). They found ulcerative colitis to be rare in Central America and Crohn's disease virtually unknown, and although the rates were twice as high in Argentina, they were still in the low incidence range. Although they point out the ethnic differences between Central America and Argentina, a genetic explanation cannot account for the differences between Argentina and Spain or Italy, the countries from where the population of Argentina is predominantly descended. Attar and Demetria described 105 minority patients with IBD in Chicago, Illinois, where the majority (85.7%) were African Americans and Hispanics comprised only 11.4% of patients (9). Most incidence and prevalence studies in different populations in the United States have limited data on Hispanics among these communities (10-15). Hiatt and colleagues studied the epidemiology of IBD in members of the Kaiser Permanente Medical Care Program in Northern California from 1971 to 1982. Of 285 validated cases of IBD, two Hispanics had ulcerative colitis and none had Crohn's disease (16). Kurata and collaborators, using data from the members of Southern California Kaiser Permanente Medical Care Program from 1982 to 1988, reported a prevalence of Crohn's disease in Hispanics of 4.1/100,000 (17). Puerto Ricans are Hispanics descending mostly from Southern European whites and black Africans, with a smaller contribution from Caribbean native Indians. A comparison to other Latin American populations based on similar genetic background may not be valid. In addition, the economic development of Puerto Rico also distinguishes it from most Latin American countries,

pointing to environmental differences. The prevalence of ulcerative colitis found in Puerto Rico in this study is comparable to that reported in the world literature, ranging from 7.8 to 229 per 100,000, and found to be lowest in Japan and highest in Rochester, Minnesota in 1991 (10,18). Our prevalence of 62.16 per 100,000 places Puerto Rico in the mid range and comparable with Great Britain in the 1960's and 70's (10). Worldwide prevalence for Crohn's disease varies from 1.2 in Galicia, Spain (10), to 144.1 in Olmsted County, Minnesota (19), and to 198.5 per 100,000 in Manitoba, Canada (20), placing Puerto Rico in the middle range with 41.4 cases per 100,000. The observed geographic variation in disease incidence and prevalence may be partially explained by differences in study design, environmental factors or genetic predisposition. Therefore, epidemiologic studies must take into account these factors in order to provide clues to its etiology (21, 22). Several countries have reported an increase in incidence of IBD, especially for Crohn's disease, followed by stabilization (11, 23-27). As a result, the prevalence has continued to increase as a result of rising incidence and improved survival (28-30).

The apparent higher prevalence in the privately insured population may reflect the impact of socioeconomic factors in the emergence of these diseases but may also be explained by a difference in access to subspecialist medical care and a more sophisticated diagnostic process. These findings contrast to those reported by Pérez and colleagues that found a larger prevalence of diabetes mellitus among the government insured population compared with the privately insured sector in Puerto Rico (31). Whether differences in diagnostic practices and increasing awareness of IBD are responsible for differences observed in both insured sectors remains unknown and warrants further investigation.

A potential source of bias in the present study is the misclassification of disease status since diagnosis may have been recorded prior to its confirmation, resulting in case ascertainment that may have been imprecise and incomplete. Since medical records were unavailable for review and confirmation of the diagnosis, a new study is being planned with current data from the insurer, utilizing a standard protocol for case ascertainment and stringent diagnostic criteria (such as radiologic, endoscopic, surgical or pathologic diagnosis), diagnosis established by a gastroenterologist in more than one occasion, and prescription medications specific for IBD to better describe the prevalence of IBD and patterns of health care utilization in this insured population. Analysis of the sensitivity and specificity is essential to determine the impact of using various case definitions on estimates of disease frequency.

Although the characteristics of individuals included in

the IBD Registry represents a highly selective population which can not be generalized to all patients with IBD, demographics and selected clinical data were similar to those reported worldwide in relation to sex, urban dwelling and family history (1). Although family income was low in the majority, this does not reflect necessarily poor hygienic or living conditions. This is supported by the high proportion of persons with education beyond high school.

Additional studies must be conducted in Puerto Rico in order to confirm the observed findings. Population-based epidemiologic studies aimed at estimating the burden of IBD in Hispanic populations in the United States and Latin America are essential for health care planning. Furthermore, accurate assessment of disease trends over time can provide clues regarding the gene-environment interactions that have been proposed as responsible for IBD.

Resumen

Los datos epidemiológicos sobre la enfermedad inflamatoria del intestino en poblaciones hispanas son limitados. Este estudio evaluó la prevalencia general y específica de la enfermedad inflamatoria del intestino (enfermedad de Crohn y colitis ulcerosa) y describió características demográficas y clínicas en un grupo de pacientes adscritos al Registro de Enfermedad Inflamatoria del Intestino de la Universidad de Puerto Rico. Para estimar la prevalencia de enfermedad inflamatoria del intestino, se analizaron todas las reclamaciones médicas y las altas hospitalarias de una compañía aseguradora con el diagnóstico principal de enfermedad de Crohn (ICD-9-CM 550.0-550.9) y colitis ulcerosa (ICD-9-CM 556.0-556.9) durante 1996. La prevalencia se estimó por edad, sexo y tipo de plan médico. Para describir características demográficas y clínicas de pacientes con enfermedad inflamatoria del intestino, se analizaron todos los datos recopilados en el Registro de Enfermedad Inflamatoria del Intestino de la Universidad de Puerto Rico entre 1995 y 2000. De 802,726 individuos asegurados, 332 tenían un diagnóstico de enfermedad de Crohn, 499 tenían colitis ulcerosa y 21 tenían un diagnóstico indeterminado. La prevalencia por cada 100,000 asegurados para enfermedad de Crohn fue 41.4, para colitis ulcerosa fue 62.2, y 106.1 para enfermedad inflamatoria del intestino. La prevalencia máxima de enfermedad de Crohn se observó en los grupos de edad 50-59 años y 60 años o más, con una razón de prevalencia (mujer:hombre) de 1.13 (IC 95%: 0.91-1.42). Colitis ulcerosa fue más prevalente entre asegurados de 50-59 años y 40-49 años. La prevalencia de colitis ulcerosa fue significativamente mayor en féminas que en varones, con una razón de prevalencia (mujer:hombre) de 1.42 (IC

95%: 1.18-1.71). De 342 pacientes incluidos en el Registro de Enfermedad Inflamatoria del Intestino, 155 (45.3%) tenían enfermedad de Crohn y 187 (54.7%) tenían colitis ulcerosa. Entre pacientes diagnosticados con enfermedad de Crohn, 51.6% eran del sexo femenino con una edad promedio de 35.2 ± 18.3 años, y 18.1% tenían un historial familiar de enfermedad inflamatoria del intestino. Más de la mitad (57.8%) de los pacientes con colitis ulcerosa eran del sexo femenino, la edad promedio era 42.6 ± 17 años, y 17.1% tenían un historial familiar de enfermedad inflamatoria del intestino. Se recomienda conducir otras investigaciones en Puerto Rico para confirmar los hallazgos observados. Estudios poblacionales diseñados para estimar el impacto de la enfermedad inflamatoria del intestino en poblaciones hispanas en los Estados Unidos y América Latina son esenciales para la planificación del cuidado de salud.

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