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ORIGINAL ARTICLE

Incidence and prevalence of inflammatory bowel diseases in a population from Buenos Aires, Argentina

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KEYWORDS
Inflammatory bowel diseases;
Incidence;
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Abstract
Background: Inflammatory bowel diseases (IBD) incidence and prevalence in Latin America have experienced a significant shift in the last decades. There is paucity of IBD epidemiologic data in Argentina.
Aim: To determine the incidence and prevalence of IBD between 2018 and 2022 of a population from the city of Buenos Aires.
Materials and methods: From January 1st, 2018 to December 31st, 2022, the total population of two healthcare insurances were studied. 'Possible' IBD cases were identified using the following information sources: IBD-unit patient databases; electronic medical record; central laboratory electronic database; histopathology electronic database; pharmacy electronic database. Age-adjusted incidence and prevalence rates for Crohn's disease (CD), ulcerative colitis (UC) and IBD were estimated based on the number of patients compared with the at-risk population and expressed per 100,000 subjects. Trends in IBD incidence and prevalence were estimated as annual percentage changes; we used Poisson regression modeling to calculate significance in these trends over time.
Results: Information source analysis rendered 172 possible cases, of which 82 cases of IBD were finally confirmed: 27.16% were CD and 72.84% were UC. Mean age-standardized incidence across the study period for IBD, CD and UC was 11.93 (11.28–12.55), 2.88 (2.65–3.07) and 9.05 (8.83–9.2) respectively. Point prevalence on December 31st, 2022 for IBD, UC and CD was 134 (95%CI 132.3–135.6), 98 (96.95–99.52) and 36 (35.69–36.4) respectively.

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Conclusions: We found an incidence and prevalence of IBD in a population from Buenos Aires higher than those previously published in epidemiological studies in Argentina.
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PALABRAS CLAVE
Enfermedad inflamatoria intestinal;
Incidencia;
Prevalencia

Incidencia y prevalencia de enfermedades inflamatorias intestinales en una población de la ciudad de Buenos Aires, Argentina

Resumen
Introducción: La incidencia y prevalencia de las enfermedades inflamatorias intestinales (EII) en Latinoamérica se han modificado notoriamente en las últimas décadas. Existe muy poca evidencia de datos epidemiológicos de Argentina.
Objetivo: Determinar la incidencia y la prevalencia de EII entre los años 2018 y 2022 en una población de la ciudad de Buenos Aires, Argentina.
Materiales y métodos: Desde el 1 de enero de 2018 al 31 de diciembre de 2022, la población de 2 aseguradoras de salud de fueron estudiadas. Casos posibles de EII fueron identificados a partir de la revisión de las siguientes fuentes de datos: la base de datos de los pacientes de las unidades de manejo de EII de cada aseguradora; las historias clínicas electrónicas; las bases de datos de los laboratorios de análisis clínicos; las bases de datos de las farmacias centrales de las aseguradoras y las bases de datos de los servicios de anatomía patológica. Una vez confirmados los casos, se calcularon las incidencias y las prevalencias ajustadas por edad de colitis ulcerosa, enfermedad de Crohn y EII, expresadas por 100.000 sujetos. Las tendencias en el tiempo de estas incidencias y prevalencias fueron estimadas como porcentajes de cambios anuales; se usó un modelo de Poisson para calcular la significancia de estas tendencias a través del tiempo.
Resultados: La revisión de las bases de datos identificó 172 casos posibles, de los que 82 fueron confirmados como pacientes con diagnóstico de EII: el 27,16% fueron pacientes con enfermedad de Crohn y el 72,84%, con colitis ulcerosa. Las incidencias ajustadas por edad promedio para EII, enfermedad de Crohn y colitis ulcerosa fue de 11,93 (11,28-12,55), 2,88 (2,65-3,07) y 9,05 (8,83-9,2), respectivamente. Las prevalencias al 31 de diciembre de 2022 fueron 134 (132,3-135,6), 36 (35,69-36,4) y 98 (96,95-99,52), respectivamente.
Conclusiones: Identificamos una prevalencia e incidencia de EII en una población de la ciudad de Buenos Aires más elevada respecto a estudios previamente publicados.
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Introduction

Inflammatory bowel diseases (IBD) are a group of chronic immuno-mediated conditions that comprise mainly ulcerative colitis (UC) and Crohn's disease (CD).[1,2] Once regarded as rare conditions, the incidence and prevalence of IBD have been increasing worldwide.[3]

Prevalence of IBD is heterogeneous when comparing different regions in the world: whereas the prevalence of IBD is relatively high in North America, Europe and Oceania,[4–6] its prevalence is significantly lower in Asia, Africa and South America.[7,8] However, as newly-industrialized countries experience a process regarded as Westernization,[9] IBD incidence in those regions has increased.[10] In contrast, some countries from Europe and Oceania have described signs of incidence stabilization in time, with a steady increase in prevalence, as life expectancy of IBD patients is not different from the general population.[11,12]

IBD incidence and prevalence in Latin America have experienced a significant shift in the last decades. Many countries in the region have reported exponential increases in their incidence and prevalence,[13] without any signs of incidence stabilization over time. Nevertheless, epidemiological data from Latin America continues to be relatively scarce when compared to other regions in the world.[14]

Argentina is country located in the southern part of Latin America, with a population of 45 million inhabitants. More than half of the population live in large urban centers: approximately 7% of its population live in its capital city, Buenos Aires. There is paucity of data on IBD incidence and prevalence in Argentina. To the best of our knowledge, only three studies have been published describing the prevalence and/or incidence of IBD in an Argentinean population.[15–17] Consequently, we sought to determine the incidence and prevalence of IBD between 2018 and 2022 of a population from the city of Buenos Aires.

Materials and methods

Study population

According to the data by the National Institute of Statistics and Census in Argentina, the country's population was 46,044,703 inhabitants. The city of Buenos Aires, the country's capital, has a population of 3,120,612, which has been stable during the last 10 years.[18]

Argentina's healthcare system is divided in both public and private healthcare centers.[14] Subjects who rely on the private healthcare system have private healthcare insurances: to date, there are over 200 healthcare-insurance companies in Argentina. It is not uncommon that a person in Argentina can have two private healthcare insurances, or that some subjects rely both on public and private healthcare systems. Each healthcare center as well as each healthcare insurance company have their own patient database, and given the lack of a unique patient identifier, efforts to merge different data sources have been unsuccessful to date. Hence, nationwide epidemiological studies are challenging in Argentina.

A few private healthcare insurances in Buenos Aires depend exclusively on one healthcare center. As a consequence, these insurances' population represent an ideal setting to study the incidence and prevalence of chronic conditions, such as IBD.

We studied the population of two of these private healthcare insurances from the city of Buenos Aires. Both insurances have a dedicated IBD unit for the diagnosis and treatment of IBD patients, which is located in each insurance's hospital in Buenos Aires. As of December 31st, 2022, their population was 61,347. The age and gender distribution of the at-risk population under study are similar to the demographic characteristics of the population of the city of Buenos Aires and is described in Fig. 1.

Case ascertainment

From January 1st, 2018 to December 31st, 2022, the total population of the two healthcare insurances under study were studied: their yearly fluctuations as well as their demographic characteristics were registered. Since both healthcare insurances lack a centralized patient database, we sought different information sources to avoid undetected exclusion of IBD patients. 'Possible' IBD cases were identified looking for patients with a diagnosis of IBD and/or UC and/or CD and/or unclassified IBD in the following information sources:

- IBD-unit patient databases: Each IBD unit has an electronic database of patients with a confirmed diagnosis of IBD that are being actively followed.
- Institutional electronic medical record (EMR): Each insurance has an EMR system that needs patient codification using ICD-10. The codification is needed for any patient visit to any healthcare facility of both insurances. This has been implemented in both cases since December 2017. K50 (CD), K51 (UC) and K52 (other unspecified non-infective gastroenteritis and colitis) were obtained during the study period.
- Central laboratory electronic database: Each insurance has a central laboratory electronic database. The type of study performed, subject identification, and the date are registered. We sought every fecal calprotectin from both institutions from January 1st, 2018 to December 31st, 2022, to identify potential patients with IBD.
- Histopathology electronic database: Each insurance has an electronic histopathology database. These databases were interrogated for potential IBD cases from January 1st, 2018 to December 31st, 2022. Potential cases were identified as those showing characteristics of chronic inflammatory colitis or chronic inflammatory enteritis in their histopathology reports.
- Pharmacy electronic database: We identified patients from January 1st, 2018 to December 31st, 2022, who received oral and/or rectal mesalamine or any of the following advanced therapies: infliximab, adalimumab, golimumab, certolizumab pegol, vedolizumab, ustekinumab or tofacitinib. By December 31st, 2022, neither ozanimod nor upadacitinib were locally approved for the treatment of UC.

For each suspected case, EMR was reviewed to confirm a diagnosis of IBD using Lennard–Jones/Porto criteria; the year of diagnosis was also established. Two authors (JL and IZ) were in charge of reviewing EMR and confirming IBD cases. The following demographic and clinical data were also extracted from the medical records: date of birth, gender, type of IBD (CD or UC), phenotype according to Montreal classification,[19] treatment with biologics or tofacitinib, and need for IBD-related surgery.

Statistical analysis

R software (version 4.2.1) was used for this purpose. Numerical variables were described as median with their 25–75% interquartile range, whereas categorical variables were described as percentages. Comparison of numerical variables was made using Mann–Whitney or Kruskal–Wallis where appropriate; for the comparison of categorical variables, the Chi-square test or Fisher test were used where appropriate.

Since case ascertainment was performed using a systematic approach described above, we estimated each information source accuracy: once definite IBD cases were identified through EMR search and chart review, we estimated the proportion of true and false positive cases for each information source search performed.

Crude incidence rates for CD, UC and IBD were estimated based on the number of patients compared with the at-risk population and expressed per 100,000 subjects, with their 95% confidence interval (95%CI). We describe incidence distribution according to gender, and we also estimated annual age-standardized incidence rates using the Buenos Aires population. Point-prevalence of CD, UC and IBD were estimated for each year of the study taking into consideration the population under study on December 31st of each year from 2018 to 2022. Prevalence was expressed per 100,000 subjects. Trends in IBD incidence and prevalence were estimated as annual percentage changes; we used Poisson regression modeling to calculate significance in these trends over time.

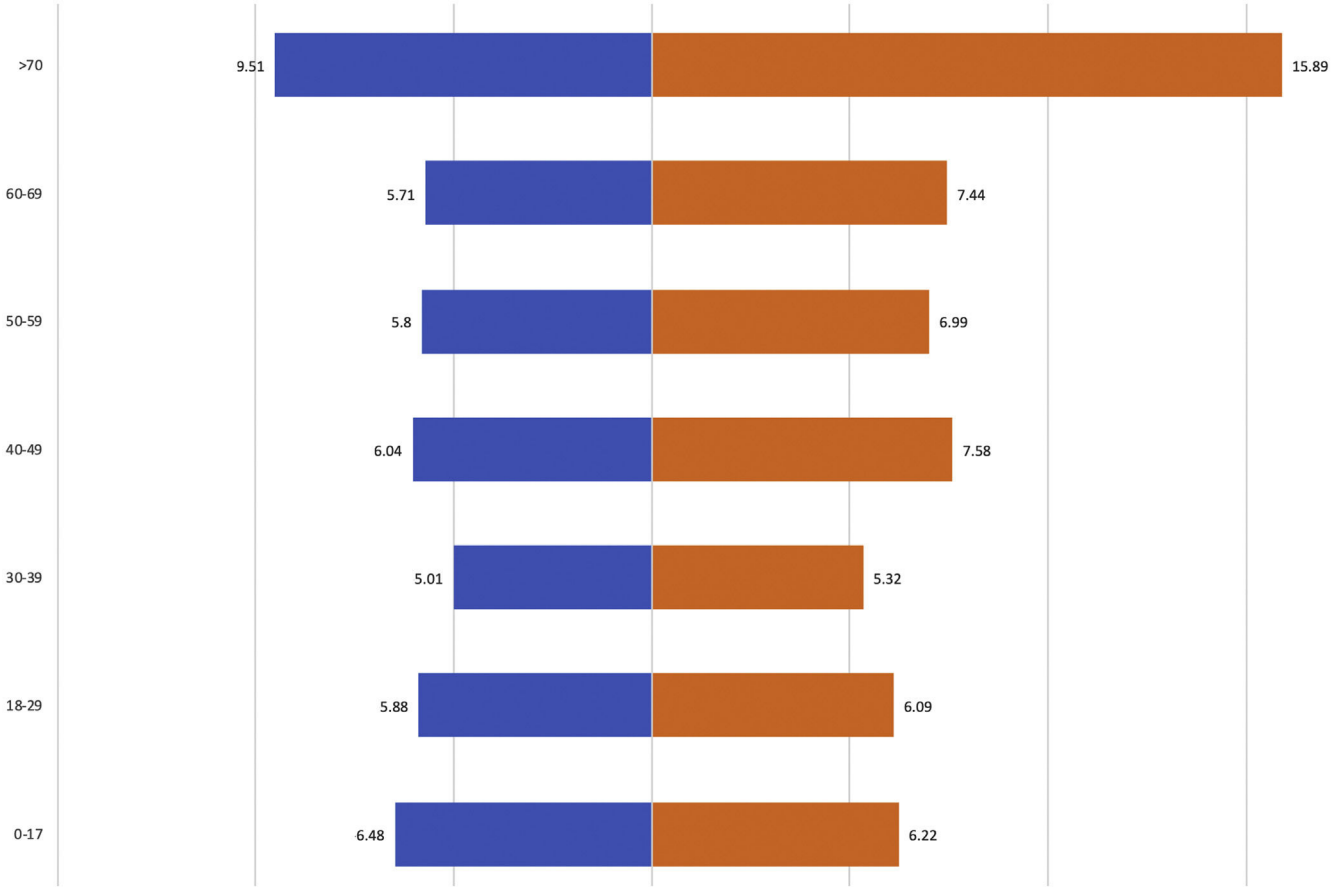

Figure 1 Age and gender distribution of the study's at-risk population as of December 31st, 2022.

Ethical considerations

Study protocol was approved by each institution's ethical committee. Since it was a retrospective observational study, no patient informed consent was necessary. Data are reported according to the Strengthening the Reporting of Observational Studies in Epidemiology statements.[20]

Results

Information sources analysis rendered 172 possible cases, of which 82 cases of IBD were finally confirmed: 27.16% were CD and 72.84% were UC. Demographic and clinical data of these patients is included in Table 1. Table 2 shows the accuracy of IBD case identification from each information source.

IBD incidence

During the study period, 31 patients were diagnosed with IBD: 29.04% were CD and 70.96% were UC. Mean annual incidence of IBD, CD and UC were 10.26 (95%CI 9.65–10.72), 2.97 (2.3–3.15) and 7.27 (6.98–7.7.6), respectively. Mean age-standardized incidence across the study period was 11.93 (11.28–12.55), 2.88 (2.65–3.07) and 9.05 (8.83–9.2), respectively (Fig. 2). Mean UC/CD ratio was 2.45. The age distribution of IBD incident cases is described in Fig. 3 and was similar between the sexes. We did not find significant changes on IBD incidence with time ($p = 0.51$).

IBD prevalence

Eighty-two patients with a diagnosis of IBD were identified, which confers a point prevalence on December 31st, 2022, of 134 (95%CI 132.3–135.6) for IBD, 98 (96.95–99.52) for UC and 36 (35.69–36.4) for CD. Age and gender distribution for IBD, UC and CD are described in Fig. 4. When stratified by age group, IBD point prevalence per 100,000 on December 31st, 2022, was 25.51 (95%CI 24.56–26.49) for <17 years old, 135.33 (127.78–143.32) for 18–29 years old, 282.26 (272.48–293.55) for 30–39 years old, 130.75 (123.97–138.16) for 40–49 years old, 101.29 (94.9–108.15) for 50–59 years old, 197.16 (188.73–206.06) for 60–69 years old and 108.45 (103.78–113.04) for >70 years old groups. UC/CD ratio was 2.72. The standardized prevalence per 100,000 population between 2018 and 2022 is described in Table 3. The annual percentage change in prevalence of IBD significantly between 2018 and 2022 at 9.9% (4.12–15.81) per year ($p = 0.001$).

Discussion

In the present study, we describe the prevalence and incidence of IBD in a defined population belonging to the city

Table 1 Main characteristics of included patients.

	Ulcerative colitis (%, *n*/*N*)	Crohn's disease (%, *n*/*N*)	OR (CI95%)	*p*
Age	50 (12–67.75)	50 (12–67)	1 (0.99–1)	0.9
Gender (%F)	48.33 (29/60)	45.45 (10/22)	1.12 (0.42–2.99)	0.82
Smoking	13.33 (8/60)	22.72 (5/22)	0.52 (0.15–1.81)	0.32
Anatomic extension – ulcerative colitis				
E1	33.33 (20/60)		N/A	N/A
E2	25 (15/60)			
E3	41.67 (25/60)			
Anatomic extension – Crohn's disease				
L1		18.18 (4/22)	N/A	N/A
L2		45.45 (10/22)		
L3		36.37 (8/22)		
L4		0		
Behavior – Crohn's disease				
B1		59.1 (13/22)	N/A	N/A
B2		27.27 (6/22)		
B3		13.63 (3/22)		
Perianal involvement		13.63 (3/22)		
Need for advanced therapy	30 (18/60)	54.54 (12/22)	0.36 (0.13–1)	0.06
Need for IBD-related surgery	6.67 (4/60)	36.36 (8/22)	0.12 (0.03–0.47)	0.002

IBD: inflammatory bowel diseases.

Table 2 Accuracy of inflammatory bowel diseases' case identification by data source.

Data source	True positives (*n*, %)	False positives (*n*, %)	% of total true positives identified
IBD unit database	54 (100)	0 (0)	65.85
ICD-10 K50-K51-K52	27 (96.42)	1 (3.57)	32.92
Central laboratory database	23 (31.94)	49 (68.06)	28.04
Central pharmacy database	28 (66.67)	14 (33.33)	34.14
Histopathology database	58 (100)	0 (0)	70.73

IBD: inflammatory bowel diseases; ICD: International Classification of Diseases.

Table 3 Standardized prevalence of inflammatory bowel diseases, ulcerative colitis and Crohn's disease per calendar year between 2018 and 2022.

Year	Population	Prevalent cases per 100,000 population		
		UC	CD	All
2018	61,449	68	24	92
2019	60,056	75	25	100
2020	59,658	84	30	114
2021	59,986	97	32	129
2022	61,347	98	36	134

of Buenos Aires, using a rigorous methodological approach to ensure adequate identification of IBD cases. According to our results, histopathology database search was the most accurate information source for the identification of IBD cases. This finding has been previously reported in other studies using similar methodology for case ascertainment.[11] In the absence of a unified healthcare system with a robust database, relying in a single information source to capture possible IBD cases may lead to the underestimation of true incidence and prevalence of IBD. Our findings show that patient registries as the sole data source for the identification of possible cases would lead to an underestimation of IBD prevalence by 34.15%.

Our study shows that the mean age-adjusted incidence of IBD was higher than previously reported in Argentina. As stated before, there is a paucity of studies assessing the incidence of IBD in Argentina. Linares de la Cal et al. published the results of a population-based study from General

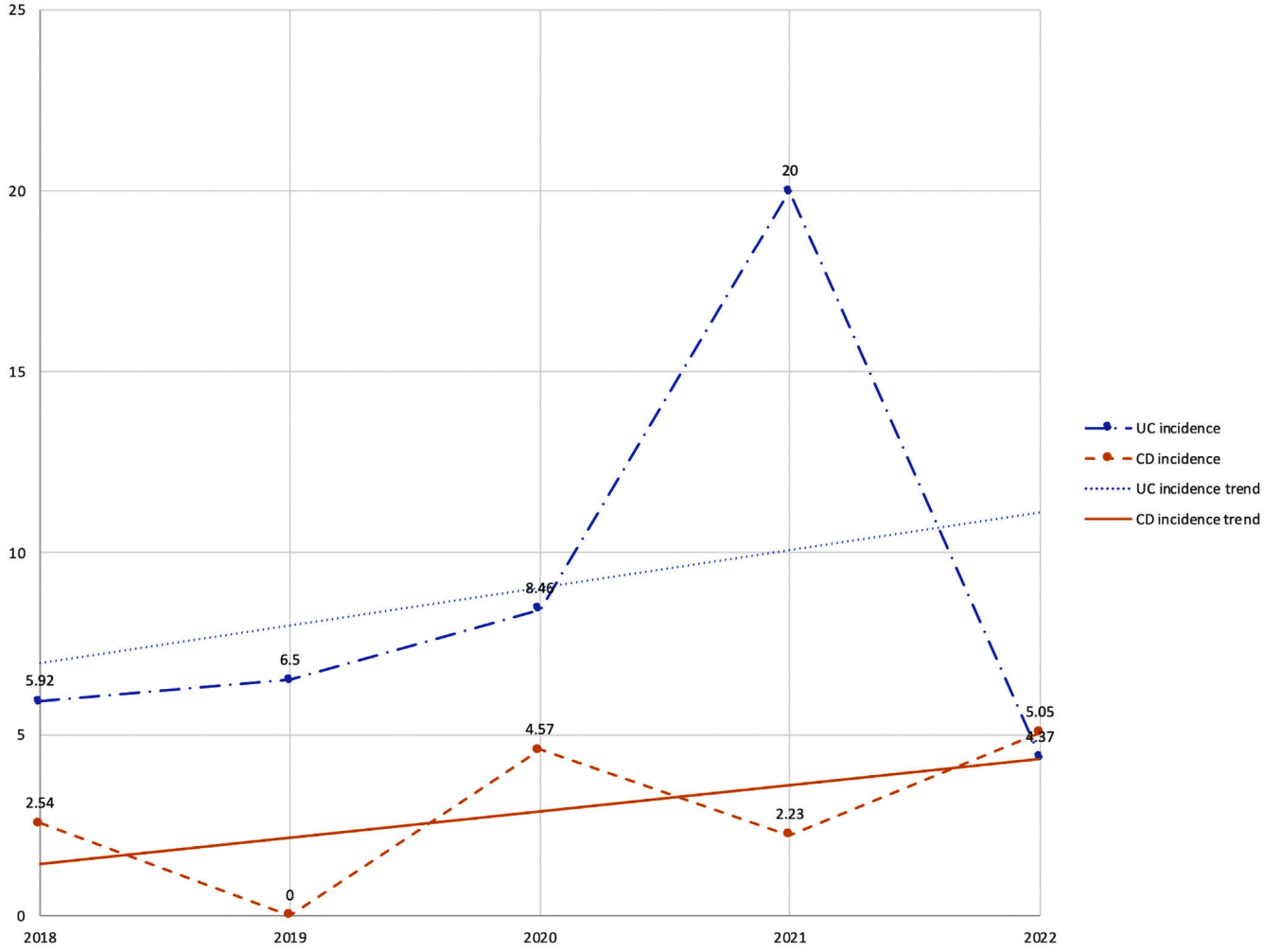

Figure 2 Mean age-standardized incidence of ulcerative colitis (UC), Crohn's disease (CD), and inflammatory bowel disease (IBD) across the study period (2018–2022).

Pueyrredón county from 1990 to 1993[15]; they reported a UC incidence of 2.2/100,000. More recently, Balderramo et al. described the age-adjusted incidence rate from the province of Córdoba in Argentina; they reported an incidence of 3.67/100,000.[17] Our results show that the incidence in our population is significantly higher and are similar to recently published data on the incidence of IBD from other Latin American regions (19).[21] We did not identify a significant annual percent change in terms of IBD incidence; however, when compared to previously published incidence rates, we hypothesize that Argentina, as well as other regions in the continent, is experiencing an acceleration of IBD incidence, as described by Kaplan and Windsor.[22] We found a high UC/CD ratio, a finding that is consistent with other epidemiological studies in Latin America, whereas in countries with a higher IBD prevalence such as Australia or Canada this ratio is inverted.[23,24]

Similar studies from other countries in Latin America have been published, which show highly heterogeneous results in terms of IBD incidence and prevalence: Juliao-Baños et al.[25] described an IBD incidence of 7.04/100,000 in Colombia, with a high UC/CD ratio (UC incidence of 6.3/100,000 and CD incidence of 0.74/100,000) – this difference in terms of UC and CD in the Colombian population is also observed in the study published by Reyes Medina et al.[26] from Bogotá, Colombia. Yamamoto Furusho et al.[27] published a population-based study describing the differences in IBD incidence from 2000 to 2015, showing an increasing IBD incidence: they describe an overall incidence of 0.05/100,000 in 2000, which increased to 0.21/100,000 in 2015.

We found an IBD point prevalence on December, 31st 2022 of 134/100,000. This rate is higher than those previously reported by prior epidemiological studies in Argentina. Sobrero et al. reported an IBD prevalence of 97/100,000,[16] whereas Balderramo et al. describe a prevalence rate of 70/100,000.[17] It should be mentioned that 38% of the total IBD population of our cohort were diagnosed in the last 5 years. This explains the statistically significant annual increase of IBD prevalence: On December 31st, 2018, IBD prevalence was 92/100,000. This means a 45.65% increase in the prevalence rate during the last five years. Our findings show the highest published prevalence for CD, UC and IBD in Latin America. We found that prevalence is higher among patients aged between 30 and 39 years old among UC patients, whereas CD prevalence reaches a peak in the

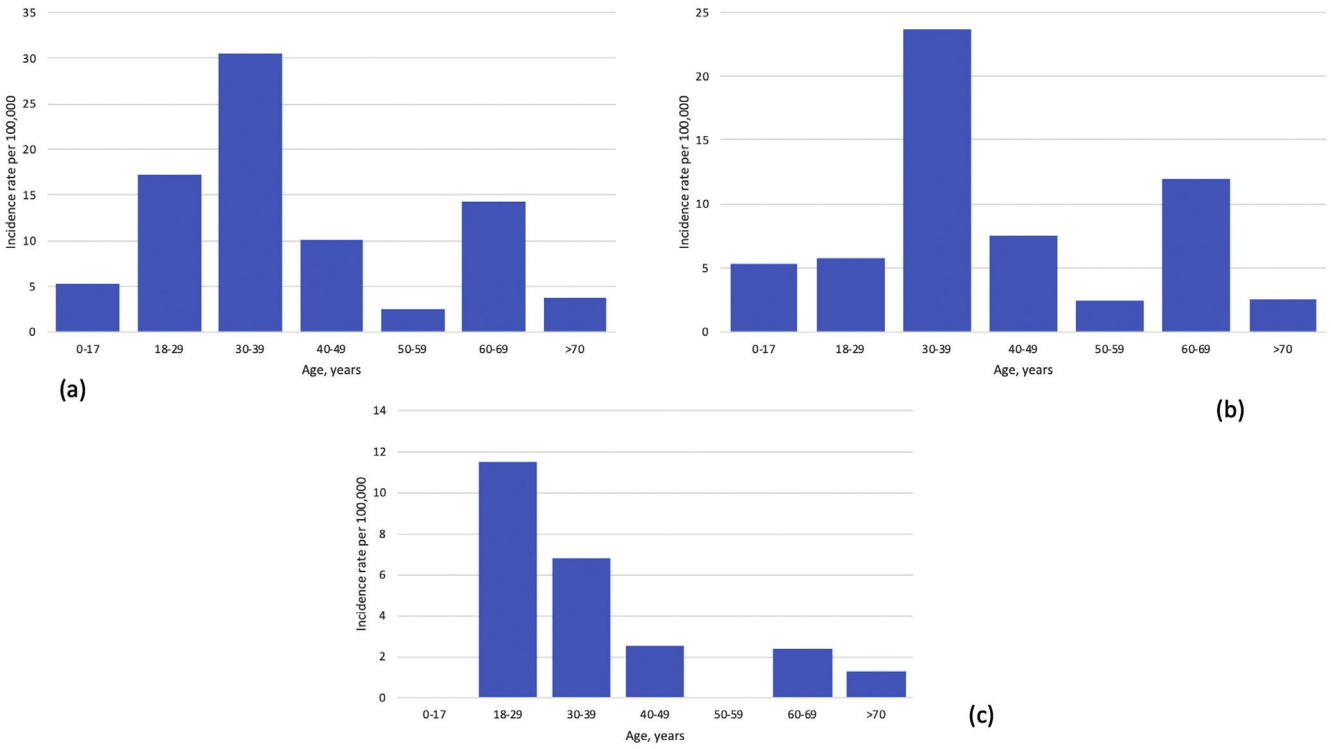

Figure 3 Age distribution of incident cases of inflammatory bowel disease (a), ulcerative colitis (b) and Crohn's disease (c).

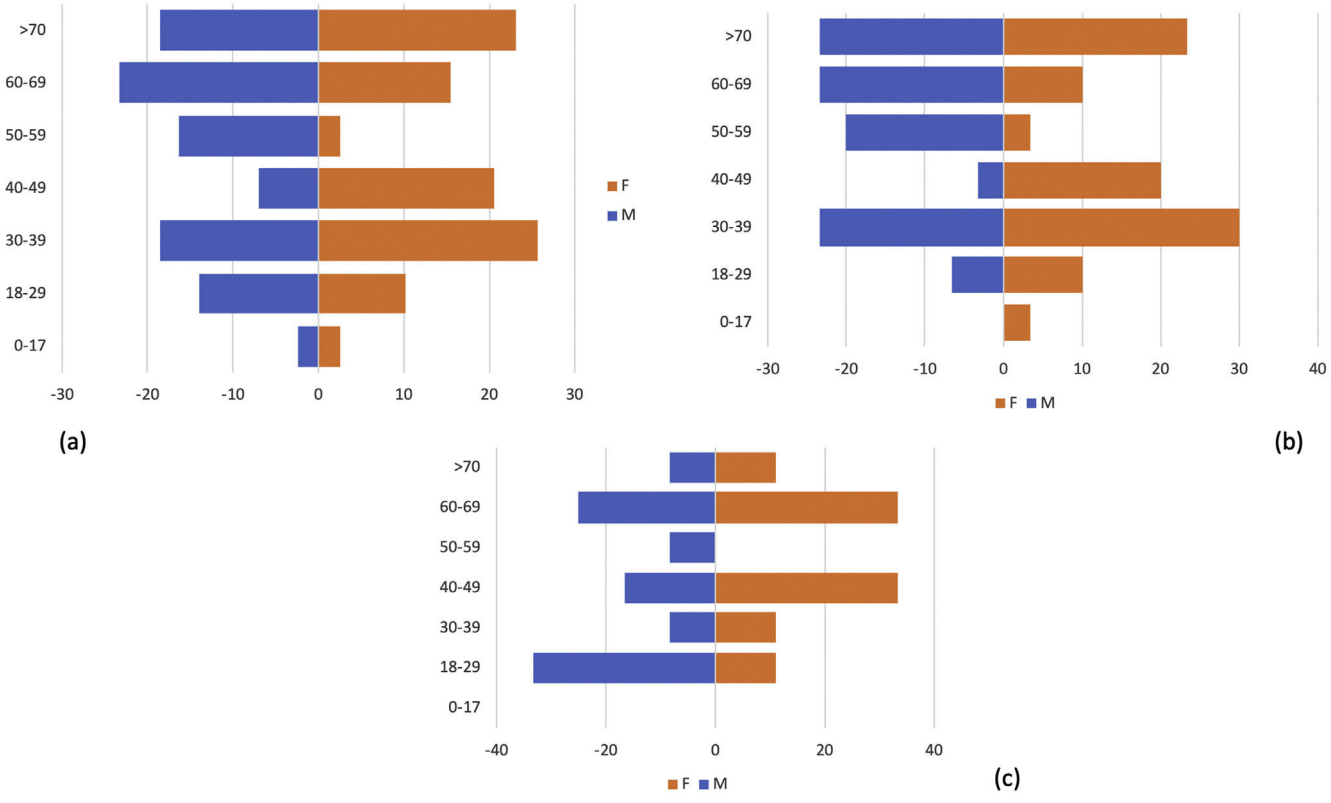

Figure 4 Age and gender distribution of prevalent cases of inflammatory bowel disease (a), ulcerative colitis (b) and Crohn's disease (c).

40–49 years-old group. The global IBD prevalence reaches a peak of 282.26/100,000 among subjects with 30–39 years.

A large cohort study published by Yamamoto Furusho et al.[28] which included 4714 patients from 9 Latin American and Caribbean countries showed some clinical characteristics that are similar to those found in our population: in most Latin American countries, UC was more common than CD, which was also found in our study. Median age of patients in our cohort was 50, whereas in the large Latin American cohort, median age was 47 years old. We also found similar a similar distribution in terms of CD behavior, with 59.1% of inflammatory phenotype. Some differences were identified, though: in our cohort, a high prevalence of colonic CD was seen, a phenomenon previously described in other local studies,[17] whereas Yamamoto Furusho et al. found that the most common anatomic location among CD patients was ileocolonic (37.3%), followed by ileal location (35.9%).

Our study has several strengths. We used a rigorous system to identify IBD cases, which allowed us to avoid missing IBD cases due to incomplete databases, which becomes relevant in a non-centralized healthcare system like the one Argentina has. We did not apply any age-related limitation for the inclusion of patients, which would reduce the selection bias and provide an accurate number of both incident and prevalent cases. Also, we were able to retrieve granular data by extensive chart review of the suspected cases.

Our study has some limitations. The population at risk is relatively small, as it represents 2% of the total population of the city of Buenos Aires. This may lead to an inaccurate estimation of IBD incidence. Nevertheless, the characteristics of our population are representative of the characteristics of the Buenos Aires population and thus may reflect the epidemiological situation of the whole population. Also, we were only able to assess data since 2018, when EMR, pharmacy, histopathology and laboratory databases became electronic. Given the relatively short length of the study period, we might have not captured significant changes in IBD incidence. As mentioned above, the paucity of epidemiologic IBD studies from Latin America are due to the lack of reliable, population-based databases. An effort toward the construction of such databases becomes evident from our results.

In conclusion, we found an incidence and prevalence of IBD in a population from Buenos Aires higher than those previously published in epidemiological studies in Argentina. This strongly suggests the change in the epidemiological scenario of these chronic conditions in Latin America. Further studies are needed to better describe the incidence and prevalence of IBD in a nationwide scenario and consequently predict the epidemiological trends of IBD.

Conflicts of interest

Juan Lasa declares fees from lectures from Pfizer, Abbvie, Takeda Pharmaceuticals, Janssen; fees from scientific advisory from Pfizer, GSK, Takeda Pharmaceuticals. Ignacio Zubiaurre declares fees from lectures from Abbvie, Pfizer, Takeda Pharmaceuticals, Janssen, GSK; fees from scientific advisory from Abbvie, Janssen, Takeda Pharmaceuticals. María Laura Parks, Deborah Pellegrini, Bárbara Finn, Ramiro Gutierrez and Pablo Olivera declare no conflicts of interests.

References

1. Torres J, Mehandru S, Colombel J-F, Peyrin-Biroulet L. Crohn's disease. Lancet. 2017;389:1741–55.
2. Ungaro R, Mehandru S, Allen PB, Peyrin-Biroulet L, Colombel J-F. Ulcerative colitis. Lancet. 2017;389:1756–70.
3. Shivananda S, Lennard-Jones J, Logan R, Fear N, Price A, Carpenter L, et al. Incidence of inflammatory bowel disease across Europe: is there a difference between north and south? Results of the European Collaborative Study on Inflammatory Bowel Disease (EC-IBD). Gut. 1996;39:690–7.
4. Bernstein CN, Wajda A, Svenson LW, MacKenzie A, Koehoorn JM, Jackson M, et al. The epidemiology of inflammatory bowel disease in Canada: a population-based study. Am J Gastroenterol. 2006;101:1559–68.
5. de Groof EJ, Rossen NGM, van Rhijn BD, Karregat EPM, Boonstra K, Hageman I, et al. Burden of disease and increasing prevalence of inflammatory bowel disease in a population-based cohort in the Netherlands. Eur J Gastroenterol Hepatol. 2016;28:1065–72.
6. Studd C, Cameron G, Beswick L, Knight R, Hair C, McNeil J, et al. Never underestimate inflammatory bowel disease: high prevalence rates and confirmation of high incidence rates in Australia. J Gastroenterol Hepatol. 2016;31:81–6.
7. Ng SC, Tang W, Ching JY, Wong M, Chow CM, Hui AJ, et al. Incidence and phenotype of inflammatory bowel disease based on results from the Asia-pacific Crohn's and colitis epidemiology study. Gastroenterology. 2013;145:158–65, e2.
8. Kotze PG, Steinwurz F, Francisconi C, Zaltman C, Pinheiro M, Salese L, et al. Review of the epidemiology and burden of ulcerative colitis in Latin America. Therap Adv Gastroenterol. 2020;13, 1756284820931739.
9. Barrett B, Charles JW, Temte JL. Climate change, human health, and epidemiological transition. Prev Med (Baltim). 2015;70:69–75.
10. Ng SC, Kaplan GG, Tang W, Banerjee R, Adigopula B, Underwood FE, et al. Population density and risk of inflammatory bowel disease: a prospective population-based study in 13 countries or regions in Asia-Pacific. Am J Gastroenterol. 2019;114:107–15.
11. Jones G-R, Lyons M, Plevris N, Jenkinson PW, BIsset C, Burgess C, et al. IBD prevalence in Lothian Scotland, derived by capture–recapture methodology. Gut. 2019;68:1953–60.
12. Kaplan GG, Ng SC. Understanding and preventing the global increase of inflammatory bowel disease. Gastroenterology. 2017;152:313–21, e2.
13. Kotze PG, Underwood FE, Damião AOMC, Ferraz JGP, Saad-Hossne R, Toro M, et al. Progression of inflammatory bowel diseases throughout Latin America and the Caribbean: a systematic review. Clin Gastroenterol Hepatol. 2020;18:304–12.
14. Queiroz NSF, Martins C, de A, Quaresma AB, Olivera Sendra PA, Ernest-Suarez K, et al. IBD barriers across the continents: a continent-specific analysis: Latin America. Therap Adv Gastroenterol. 2023:16, http://dx.doi.org/10.1177/17562848231167953.
15. Linares de la Cal JA, Cantón C, Hermida C, Pérez-Miranda M, Maté-Jiménez J. Estimated incidence of inflammatory bowel disease in Argentina and Panama (1987–1993). Rev Esp Enferm Dig. 1999;91:277–86.
16. Sobrero MJ, Varela E, Gonzalez ML, Piccioni HL, Bohbouth GE, Orsi M, et al. M1155 prevalence of inflammatory bowel disease in a university hospital health maintenance organization. Gastroenterology. 2009;136. A-361–A-362.
17. Balderramo D, Trakal J, Herrera Najum P, Vivas M, Gonzalez R, Benavidez A, et al. High ulcerative colitis and Crohn's disease ratio in a population-based registry from Córdoba, Argentina. Digest Liver Dis. 2021;53:852–7.

18. Instituto Nacional de Estadística y Censos de la República Argentina. Censo 2022. 2022. https://www.indec.gob.ar/indec/web/Nivel4-Tema-2-41-165 [accessed 30.7.23].
19. Silverberg MS, Satsangi J, Ahmad T, Arnott ID, Bernstein CN, Brant SR, et al. Toward an integrated clinical, molecular and serological classification of inflammatory bowel disease: report of a Working Party of the 2005 Montreal World Congress of Gastroenterology. Can J Gastroenterol. 2005;19 Suppl. A:5A–36A.
20. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP, et al. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. J Clin Epidemiol. 2008;61:344–9.
21. Renuzza SSS, Vieira ER, Cornel CA, Lima MN, Ramos Junior O. Incidence, prevalence and epidemiological characteristics of inflammatory bowel diseases in the state of Paraná in Southern Brazil. Arq Gastroenterol. 2022;59:327–33.
22. Kaplan GG, Windsor JW. The four epidemiological stages in the global evolution of inflammatory bowel disease. Nat Rev Gastroenterol Hepatol. 2021;18:56–66.
23. Bhatia R, Yeoh SW, Vaz K, Studd C, Wilson J, Bell S, et al. Inflammatory bowel disease incidence, prevalence and 12-month initial disease course in Tasmania, Australia. Intern Med J. 2019;49:622–30.
24. Bitton A, Vutcovici M, Patenaude V, Sewitch M, Suissa S, Brassard P. Epidemiology of inflammatory bowel disease in Québec: recent trends. Inflamm Bowel Dis. 2014;20:1770–6.
25. Juliao-Baños F, Kock J, Arrubla M, Calixto O, Camargo J, Cruz L, et al. Trends in the epidemiology of inflammatory bowel disease in Colombia by demographics and region using a nationally representative claims database and characterization of inflammatory bowel disease phenotype in a case series of Colombian patients. Medicine (Baltimore). 2021;100:e24729.
26. Reyes Medina GA, Gil Parada FL, Carvajal Patiño GD, Sánchez Luque CB, Aponte Martin DM, González CA, et al. Enfermedad inflamatoria intestinal: características de fenotipo y tratamiento en un hospital universitario de Bogotá, Colombia. Rev Colomb Gastroenterol. 2018;33:117–26.
27. Yamamoto-Furusho JK, Sarmiento-Aguilar A, Toledo-Mauriño JJ, Bozada-Gutiérrez KE, Bosques-Padilla FJ, Martínez-Vázquez MA, et al. Incidence and prevalence of inflammatory bowel disease in Mexico from a nationwide cohort study in a period of 15 years (2000–2017). Medicine (Baltimore). 2019;98:e16291.
28. Yamamoto-Furusho JK, Parra-Holguín NN, Juliao-Baños F, Puentes F, López R, Bosques-Padilla F, et al. Clinical differentiation of inflammatory bowel disease (IBD) in Latin America and the Caribbean. Medicine (Baltimore). 2022;101:e28624.