

Original article

Latin American research in heart failure: visual and bibliometric analysis of the last 20 years

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ABSTRACT

Objective. To visually and bibliometrically analyze Latin American research on heart failure over the last 20 years.

Materials and methods. A bibliometric study using the Scopus database. A non-systematic search was performed to collect data, which were analyzed using Bibliometrix, a tool of the R programming language. **Results.** A total of 10,204 documents were included in a period between 2003 and 2023. Of these, 66.9% (n=6,824) corresponded to original articles, followed by review articles (15.5%; n=1,583). International collaboration was present in 38.41% (n=3,919) of the articles. Brazil stood out with the highest number of prolific authors and institutions (70% and 60%, respectively), consolidating its position as leader in the region, followed by Argentina and Mexico. These countries also presented the papers with the highest impact and most outstanding metrics. **Conclusions.** This study identified a significant increase in heart failure research in Latin America over the last two decades, with Brazil, Argentina, and Mexico being the main drivers of this trend. Extensive and strong collaboration, mainly with high-income countries, appears to be critical to the momentum and the advancement of research in this area. Data systematization and resynchronization therapy are some of the topics of greatest interest at present.

Keywords: Heart Failure; Cardiovascular Diseases; Bibliometrics; Latin America (source: MeSH-NLM).

Introduction

Heart failure is one of the most prevalent cardiovascular disease phenotypes in Latin America and worldwide ^(1,2). According to data from clinical studies, it is estimated that in the Latin American region, the incidence of heart failure may be approximately 200 cases per 100,000 inhabitants per year, and the prevalence is close to 1% of the total population ⁽³⁾. This condition predominantly affects individuals in their functional years and at risk of premature death (with a mean ejection fraction of 36%) around the age of 60 ⁽³⁾, potentially indicating a high prevalence of symptomatic heart failure among cases, significantly affecting health outcomes and quality of life ⁽⁴⁾.

Research gaps, specifically in heart failure in Latin America, have been a problem reported by several authors ^(5,6). This involves the development and addressing of a cardiac phenotype based on social, cultural, genetic, demographic, and health characteristics specific to a region, differing from other global contexts ⁽⁷⁾. This, coupled with barriers in timely access to specialized and high-quality health services, as well as the availability of drugs and technological tools facilitating personalized medicine implementation ⁽⁸⁾, negatively influences the prognosis of this disease. Translational and experimental research could be population-based research approaches that address questions of interest

in heart failure, enabling the development of techniques, the use of biomarkers, and interventions with significantly favorable outcomes⁽⁹⁾. However, in order to answer such a question, it is necessary to understand the evolution and trends in research in the continent. In this way, evidence-based roadmaps could be designed considering the availability and quality of evidence in the Latin American context but adapted to the health development context and characteristics of the population⁽¹⁰⁾.

Bibliometrics is an essential tool for quantifying and describing the behavior of scientific research, widely used in biomedical sciences⁽¹¹⁾. It allows for calculating the impact of scientific production and visualizing collaboration networks and how research is conducted and published. This should be correlated with the quality and systematization of evidence to assess gaps, pluralism, and relevance in medical research⁽¹²⁻¹⁴⁾.

Previously, bibliometric studies have been conducted on heart failure in Latin America, but these are limited to describing the scientific production of a single country⁽¹⁵⁾. Thus, the scientific growth and associated characteristics of this topic in our region are unknown. To provide more rigorous and relevant information in the regional context, serving as a basis for the design of future studies and lines of work, the aim of this study was to visually, descriptively, and bibliometrically assess Latin American research in heart failure over the last 20 years.

Materials and Methods

Study design

Bibliometric study

Databases

Scopus, the most extensive database of peer-reviewed scientific literature, was used as a source for this analysis⁽¹⁶⁾. Currently, under the medical literature category, this database indexes more than 15,000 journals⁽¹⁷⁾. Moreover, compared to other search engines, citation indexes, and medium-high-quality databases such as PubMed, PubMed Central, and Web of Science, Scopus has a greater number of indexations of Latin American biomedical journals, facilitating the identification of evidence related to the research question⁽¹⁸⁾.

Search strategy

A non-systematic search was designed and conducted to identify articles related to research on heart failure, whether basic, translational, clinical, experimental, or others with Latin American affiliations. For this purpose, the affiliation reported in the metadata was taken into account and corroborated by

the official full-text publication. The search strategy was built based on MeSH terms and English synonyms (considering that they are published in a standardized manner in both English and Spanish). Before the execution of the final strategy, a pilot test was conducted. After that test, the following strategy was used: TITLE-ABS-KEY("Heart Failure") OR TITLE-ABS-KEY("Cardiac Failure") OR TITLE-ABS-KEY("Heart Decompensation") OR TITLE-ABS-KEY("Right-Sided Heart Failure") OR TITLE-ABS-KEY("Right Sided Heart Failure") OR TITLE-ABS-KEY("Myocardial Failure") OR TITLE-ABS-KEY("Congestive Heart Failure") OR TITLE-ABS-KEY("Left-Sided Heart Failure") OR TITLE-ABS-KEY("Left Sided Heart Failure") OR TITLE-ABS-KEY("Diastolic Heart Failures") OR TITLE-ABS-KEY("Diastolic Heart Failure") OR TITLE-ABS-KEY("Systolic Heart Failures") OR TITLE-ABS-KEY("Systolic Heart Failure") AND AFFILCOUNTRY (antigua AND barbuda) OR AFFILCOUNTRY (argentina) OR AFFILCOUNTRY (bahamas) OR AFFILCOUNTRY (barbados) OR AFFILCOUNTRY (belice) OR AFFILCOUNTRY (bolivia) OR AFFILCOUNTRY (brazil) OR AFFILCOUNTRY (chile) OR AFFILCOUNTRY (colombia) OR AFFILCOUNTRY (costa AND rica) OR AFFILCOUNTRY (cuba) OR AFFILCOUNTRY (dominicana) OR AFFILCOUNTRY (ecuador) OR AFFILCOUNTRY (el AND salvador) OR AFFILCOUNTRY (grenada) OR AFFILCOUNTRY (guatemala) OR AFFILCOUNTRY (guyana) OR AFFILCOUNTRY (haiti) OR AFFILCOUNTRY (honduras) OR AFFILCOUNTRY (jamaica) OR AFFILCOUNTRY (mexico) OR AFFILCOUNTRY (nicaragua) OR AFFILCOUNTRY (panama) OR AFFILCOUNTRY (paraguay) OR AFFILCOUNTRY (peru) OR AFFILCOUNTRY (dominican AND republic) OR AFFILCOUNTRY (saint AND lucia) OR AFFILCOUNTRY (suriname) OR AFFILCOUNTRY (trinidad AND tobago) OR AFFILCOUNTRY (uruguay) OR AFFILCOUNTRY (venezuela) AND PUBYEAR > 2002 AND PUBYEAR < 2024 AND (LIMIT-TO (SRCTYPE , "j")). Thus, the search was limited to Latin American countries, documents published in peer-reviewed journals, and those published between 2003 and 2023.

Data collection and standardization

Although the search was designed in English, considering that Spanish and Portuguese are predominant in Latin America, articles published in these languages were included. Once the search was conducted, data such as the publication year, article title, journal details, article type, keywords, affiliations, author details, citations, scientific collaboration, and details about the editorial and publication process were exported. This search was conducted until October 7, 2023. Finally, documents published under the standard peer-review process, specifically in scientific journals, were included, where the participation of at least one Latin affiliation was identified. Literature that does not follow the

regular peer-review process for publication in scientific journals, such as books, book series, abstracts, and proceedings of scientific events, was excluded.

After this initial phase, a manual review was conducted by two authors (G.B.M. and Y.A.P.J.) to eliminate duplicates and articles not related to the topic of interest, based on title, abstract, and keywords. Standardization and manual review were performed in Microsoft Office Excel 2016. Finally, in the third step, three authors (G.A.G.P., E.R.P., and Y.A.P.J.) conducted another manual review to standardize the data of the variables of interest and reduce discrepancies between the way in which the metadata was originally recorded. Thus, categories were regrouped; for example, all original articles, regardless of observational or experimental design, were categorized as "Articles". Similarly, all reviews, regardless of their approach (whether narrative, systematic, or meta-analysis), were categorized as "Reviews". Case series and case reports were categorized as "Case Report", and editorials, letters to the editor, comments, among others, were categorized as "Correspondence". Similarly, to ensure specificity in Latin affiliations, these were reviewed and corroborated.

Statistical, Visual, and Bibliometric Analysis

To determine and assess the trends, characteristics, and scientific impact of Latin American research on heart failure, network and bibliometric metrics were used. All documents that met the inclusion criteria were included in the overall analysis. The R package Bibliometrix package, which allows the calculation of quantitative bibliometric indicators and visualization of results (version 4.3.1), was used for this analysis⁽¹⁹⁾. Synonyms, errors, plurals, and variants were carefully grouped to homogenize the analysis. Keywords, authors, and institutions were standardized.

In addition, a descriptive analysis and characterization of the scientific production found were carried out, evaluating the annual scientific growth, average citations per year, publication frequency, and impact indicators. The most prolific authors and the distribution of publications were characterized using Lotka's Law. The studies that have accumulated the greatest impact on heart failure research in Latin America were also specified. Collaboration networks were constructed to determine the degree of collaboration among countries in the region and outside the continent.

Metrics such as the h-index, g-index, m-index, and the absolute value of cumulative citations were used to measure the impact of authors, institutions, and countries. The definitions and specifications of the use of these metrics in bibliometric studies were previously described^(20,21). The calculation of frequencies and percentages was performed using Microsoft Office Excel 2016.

Ethical aspects

Approval from an ethics committee was not required for this study as it did not involve research on humans, biological models, or the use of medical records.

Results

Initially, 10,697 documents were identified. Subsequently, after applying inclusion and exclusion criteria, a total of 10,204 documents were finally selected, covering the period from 2003 to 2023. Of these, 66.9% (n=6,824) were original articles, followed by review articles (15.5%; n=1,583). A total of 66,940 authorships were recorded, of which 0.69% were single-authored papers. International collaboration accounted for 38.41% (n=3,919). The average annual growth rate of scientific production was 8.32%, and the average number of citations received was 30.75 (Table 1). In the evaluated time window, a steady growth was observed since 2003 in Latin scientific production on heart failure, reaching a peak of documents (n=1,052) in 2021, with a decline until 2023 (Figure 1A). A similar trend was observed in citations received, with a peak in 2017 (average of 6.5 citations) and a dramatic decrease until 2023 (Figure 1B).

Table 1. General characteristics of latin american scientific production on heart failure (N=10,204).

	n	%
Article type		
Original article	6,824	66.9
Review	1,583	15.5
Case report	1,039	10.2
Correspondence*	758	7.4
Authors		
Autorships	66,940	-
Authors of single-author documents (N=66,940)	418	0.62
Collaboration		
Single-author articles	527	5.16
Co-authorships per article (mean)	12.2	-
International co-authorship	3,919	38.41
Keywords	13,117	-
Journals	2,025	-
Annual growth rate	-	8.32
Mean article age (years)	7	-
Mean citations per document	30.75	-

*Includes letters to the editor, editorials, comments, etc.

When analyzing journals of interest for the publication of research on heart failure by Latin authors, it was found that *Arquivos Brasileiros de Cardiologia* (n=917; 8.9%), *International Journal of Cardiology* (n=224; 2.19%), and *Revista Colombiana de Cardiología* (n=118; 1.15%) have the highest number of repositied documents (Figure 2A). On the other hand, when evaluating journals with the highest impact received by articles published on heart failure with Latin authorship, it is observed that *New England Journal of Medicine* (h-index = 58), *Circulation* (h-index = 57), and *Journal of the American College of Cardiology* (h-index = 51) lead this list (Figure 2B). Measuring the g- and m-indexes, *Circulation* (g-index = 112) (Figure 2C) and *New England Journal of Medicine* (m-index = 2.76) (Figure 2D) have the most prominent metrics, respectively. *New England Journal of Medicine* is the journal with the highest number of cumulative citations (51,885

citations). Finally, when measuring the cumulative occurrence of publication among the journals of greatest interest to authors a steady growth is observed among the top 7, led by *Arquivos Brasileiros de Cardiologia* (Figure 2E). In contrast to the annual publication frequency, where the behavior was fluctuating, but led by the same journals of greatest interest (Figure 2F).

In relation to the 10 most prolific authors on heart failure in the region, it is revealed that 70% are Brazilian, followed by 20% with Argentine affiliation. Edimar Alcides Bocchi, from the Universidade de São Paulo (Brazil), and Rafael Díaz, from the Instituto Cardiovascular de Rosario (Argentina) are the authors with the highest number of published articles on heart failure, with frequencies of 151 and 100, respectively. However, Rafael Díaz and Alvaro Avezum (from Hospital Alemão Oswaldo Cruz, Brazil) have the highest impact, with h-index values of 48 and

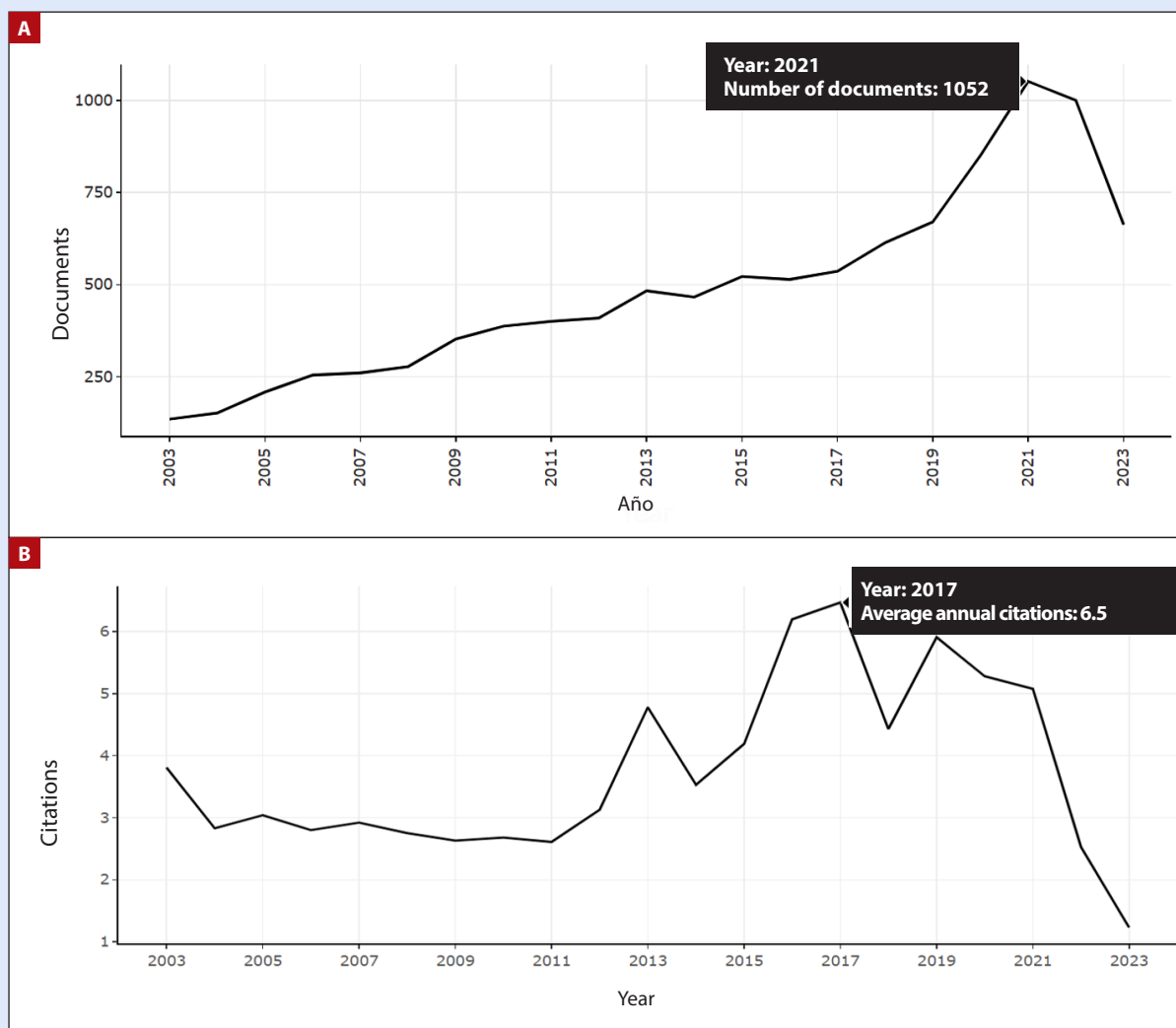


Figure 1. Annual Scientific Growth of Heart Failure Research in Latin America. (A) Annual production volume. (B) Average annual citations received.

Table 2. Summary of prolific authors, affiliations, and latin american countries in heart failure research.

Authors	Documents on heart failure	h-index	g-index	m-index	Total citations	Affiliation	Country
Edimar Alcides Bocchi	151	31	54	1.47	3,469	Universidade de São Paulo	Brazil
Rafael Díaz	100	48	100	2.4	21,155	Instituto Cardiovascular de Rosario	Argentina
Fernando Bacal	96	27	46	1.28	2,401	Universidade de São Paulo	Brazil
Evandro Tinoco Mesquita	94	16	46	0.76	2,206	Universidade Federal Fluminense	Brazil
Luis E Rohde	81	22	50	1.04	2,588	Universidade Federal do Rio Grande do Sul	Brazil
Nadine Clausell	76	26	76	1.3	6,413	Hospital de Clínicas de Porto Alegre	Brazil
Felipe Martínez	75	26	44	1.23	10,732	Universidad Nacional de Córdoba	Argentina
Charles Mady	74	19	34	0.9	1,338	Universidade de São Paulo	Brazil
Alvaro Avezum	66	45	66	2.14	18,099	Hospital Alemão Oswaldo Cruz	Brazil
Sergio Lavandero	62	30	60	1.42	3,677	Universidad de Chile	Chile
Affiliation	Documents over time				Total documents on heart failure	h-index	Country
	2003 – 2007	2008 – 2012	2013 – 2017	2018 - 2023			
Universidade de São Paulo	606	1,068	885	1,071	3,630	105	Brazil
Universidade Federal de São Paulo	89	166	240	259	754	55	Brazil
Universidade Federal de Minas Gerais	30	193	140	356	719	54	Brazil
Universidade Federal do Rio Grande do Sul	43	111	147	327	628	49	Brazil
Pontificia Universidad Católica de Chile	97	88	83	246	514	44	Chile
Universidade Federal Fluminense	35	156	118	169	478	24	Brasil
Instituto Nacional de Cardiología Ignacio Chávez	28	36	32	309	405	40	Mexico
Universidad de Chile	67	93	68	109	337	38	Chile
Hospital Italiano de Buenos Aires	14	52	86	175	327	40	Argentina
Universidade Federal do Rio de Janeiro	30	58	106	89	283	44	Brazil
Country	Documents over time				Total documents on heart failure*	h-index	SCP
	2003 – 2007	2008 – 2012	2013 – 2017	2018 - 2023			
Brazil	367	913	1,211	2,338	4,829	182	3,269
Argentina	88	231	348	720	1,387	133	639
Mexico	106	144	254	694	1,198	91	612
Colombia	17	67	231	530	845	70	391
Chile	67	92	189	328	676	80	212
Peru	5	11	51	137	204	42	52
Cuba	21	31	39	83	174	16	92
Venezuela	34	40	46	42	162	35	36
Uruguay	14	18	42	62	136	31	37
Ecuador	1	6	16	82	105	24	18

SCP: Single Country Publication.

* Each production was counted individually. Therefore, a document could have been counted multiple times based on international collaboration.

45, respectively. This trend is similar in terms of the total number of citations obtained and m-index values, where the latter two authors lead these metrics (21,155 and 18,099 citations, and m-indexes of 2.4 and 2.14, in that order) (Table 2). Additionally, applying Lotka's Law, it is evident that 69.2% (n=46,305) of the total identified Latin authors have only published one article related to heart failure, while 17.1% (n=11,458) and 0.3% (n=168) have published at least 2 and 10 articles, respectively.

When analyzing the most productive affiliations on the subject, it is determined that the three most prolific institutions are Brazilian, with the Universidade de São Paulo standing out significantly in terms of the number of documents published and impact obtained (n=3630 and h-index = 105), followed by the Universidade Federal de São Paulo (n=754 and h-index = 55) and the Universidade Federal de Minas Gerais (n=719 and h-index = 54) (Table 2). When assessing the transition in production since 2003, Argentine and Mexican institutions have experienced slow growth compared to Brazilian and Chilean ones, whose growth has been more notable, especially in the period 2018–2023, where many even doubled or tripled their production (Table 2). Exploring the collaboration and collaboration strength of the

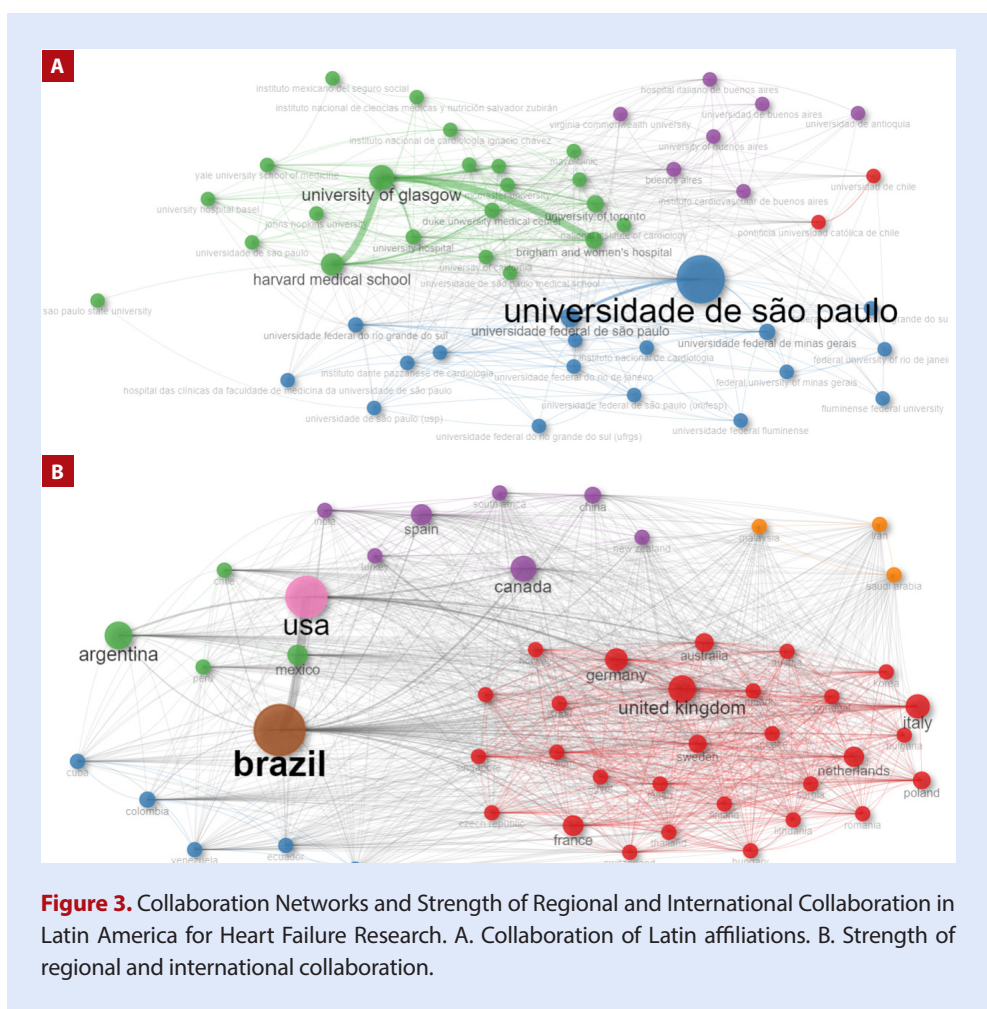
institutions, it is observed that the Universidade de São Paulo, the most prolific, has a strong and diverse collaboration network, both regionally and intercontinentally, highlighting collaboration with American institutions such as Harvard Medical School and Brigham and Women's Hospital, as well as with the University of Toronto in Canada and the University of Glasgow in Scotland (Figure 3A).

When examining the behavior of countries, it is recognized that Brazil (n=4829), Argentina (n=1387), Mexico (n=1198), Colombia (n=845), and Chile (n=676) are the most prolific countries in the region. In terms of impact, Brazil (h-index = 182), Argentina (h-index = 133), and Mexico (h-index = 91) lead. Globally, the trend in production growth has been similar, with a significant peak starting in 2013, where some countries doubled their production between 2013–2017, and then doubled this latter value between 2018–2023 (Table 2). Regarding collaboration, Brazil's extensive network is notable, with essential collaborations with both the United States and Canada and several European countries, including some Asian ones (Figure 3B).

When detailing articles on heart failure with Latin authorship (excluding studies with massive collaboration) that have obtained



Figure 2. Evolution of Journals and Impact of Their Heart Failure Publications by Latin American Authors. (A) Frequency of published articles. (B) h-index of articles. C. g-index of articles. (D) m-index of articles. (E) Cumulative frequency of articles published over time. (F) Annual frequency of articles published on heart failure in Latin America and the Caribbean.



the greatest impact, the following are found: 1) Effect of nesiritide in patients with acute decompensated heart failure (total citations: 1036; citations per year: 79.69; participating countries: Colombia, Brazil, Chile, Argentina, Mexico; DOI: 10.1056/NEJMoa1100171); 2) Transendocardial, autologous bone marrow cell transplantation for severe, chronic ischemic heart failure (total citations: 1168; citations per year: 55.62; participating country: Brazil; DOI: 10.1161/01.CIR.0000070596.30552.8B); and 3) Heart failure: preventing disease and death worldwide (total citations: 813; citations per year: 8.3; participating country: Brazil; DOI: 10.1002/ehf2.12005). All of these were published in very high-impact journals, with collaboration from high-income countries.

Finally, when examining trends in research on heart failure in Latin America, interesting findings were observed. Through word clouds, it was found that Chagas cardiomyopathy ($n=413$), heart failure associated with acute myocardial infarction ($n=296$), systematic reviews ($n=245$), ejection fraction and its categories ($n=227$), as well as chronic heart failure ($n=206$), are some of the most frequent study topics in Latin American heart failure (**Figure 4A and 4B**). Using thematic maps, it was possible to identify

that the fundamental themes constituting research questions are related to ejection fraction, chronic disease, cardiovascular risk factors, decompensation, and Chagas disease. As emerging topics or those associated with the previously described fundamental themes, obstructive sleep apnea, resynchronization therapy, transcatheter aortic valve replacement, and pulmonary hypertension were found (**Figure 4C and 4D**). In addition, by dividing the research approaches that have been of interest in heart failure in Latin America between the years 2003–2017 and 2018–2023, it is evident that a significant number of topics are maintained, with the addition of interest in evidence systematization, the study of atrial fibrillation, and cardiac resynchronization (**Figure 4E**).

Discussion

This study represents the first analysis in Spanish that examines the trends and evolution of research and scientific publication on heart failure in Latin America over a period of 20 years. According

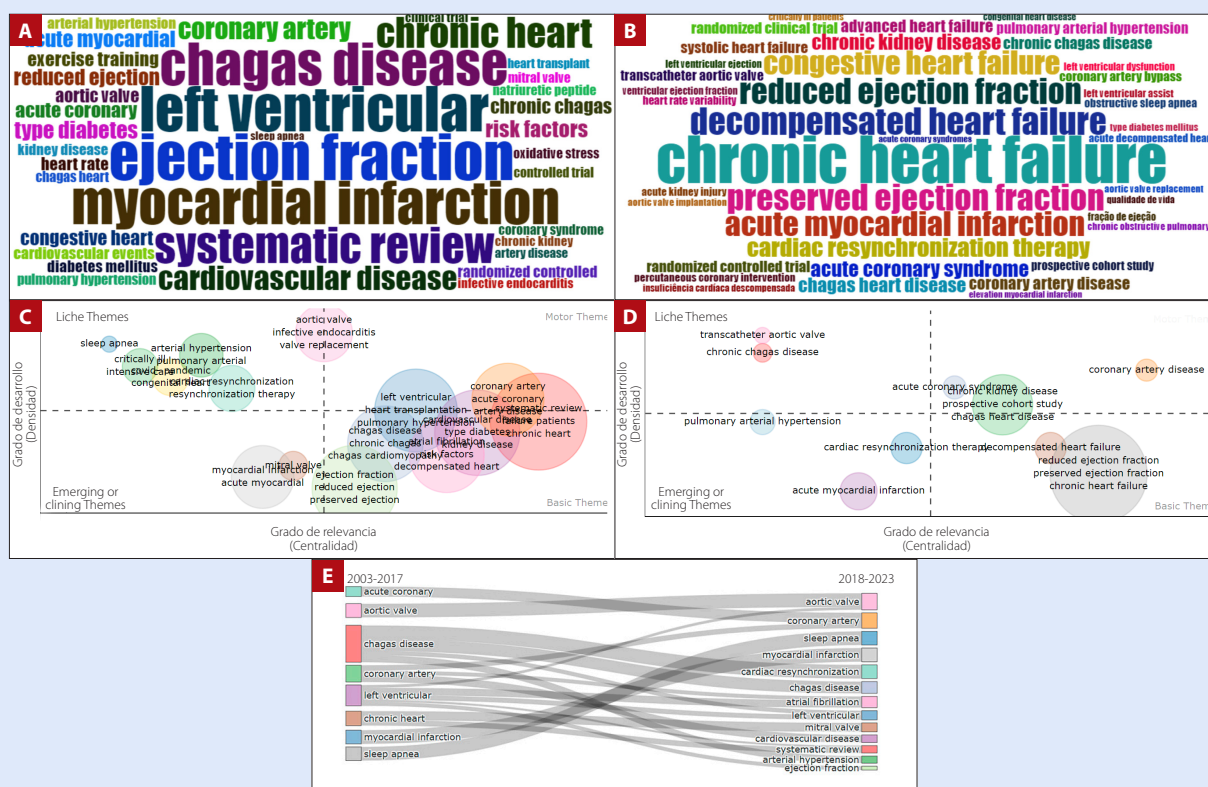


Figure 4. Trends in Heart Failure Research. (A) Word cloud of most frequent bigram keywords. (B) Word cloud of most frequent trigram keywords. (C) Thematic map of the most relevant bigrams. (D) Thematic map of the most relevant trigrams. (E) Transition of trends over time.

to data from scientific societies and public institutions in Latin America, heart failure is one of the most prevalent cardiovascular diseases in the region, with significant needs in the quest to improve outcomes and health indicators associated with this condition^(22,23). However, there is no clear and specific roadmap for each country that adopts its priorities based on demand and health outcomes, facilitating the design and implementation of research projects aimed at addressing potentially relevant problem questions and positively impacting the population. For example, prior to designing a strategy or policy, it is necessary to know the gaps and relevance in medical research to determine whether clinical, social, translational, or basic research in heart failure is a priority⁽²³⁾. This involves quantitatively assessing production, covered topics, and areas of knowledge, as well as identifying leading institutions and researchers who are potential collaborators to promote collaborative research.

Of the total documents analyzed, it was observed that predominantly (66.9%), they correspond to original studies, highlighting the interest and progress in the production of primary data in heart failure research. However, compared to a recent global bibliometric study on heart failure⁽²⁴⁾, which covered the period from 2009 to 2019 in Web of Science, it was found that

the total number of documents was 21,484. Although the time windows and evaluated databases differ, this finding suggests that scientific production in Latin America could represent a significant percentage of global production. This phenomenon could indicate that, despite difficulties in infrastructure, funding, and the availability of human talent exclusively dedicated to research, the region has progressed following global research trends in heart failure. This progress is reflected in the high percentage of international collaboration (approximately 40%) and the low proportion of single authorship (0.69%). Additionally, an annual growth rate close to 9% was observed, with an average of 30 citations. Despite these positive indicators, a notable reduction in citations received in recent years was observed, which may be due to a short period between publication and analysis or a decrease in interest in specific studies or articles in national and international scientific discourse. Compared to other bibliometric analyses on the same topic⁽²⁵⁾, which show steady growth to the present day, in Latin America, the impact demonstrated by citations has decreased, posing a challenge for the continuous evaluation of ideas and projects in heart failure⁽²⁶⁾. Even correlating whether the approaches and types of research are related to the region's science and health needs.

When it comes to regional scientific cardiology journals of interest, it was highlighted that *Arquivos Brasileiros de Cardiologia* and *Revista Colombiana de Cardiologia* have a significant number of documents. This suggests that in cases of predominantly local or regional research, authors may prefer journals from their region or their own journals⁽²⁷⁾. Nevertheless, *International Journal of Cardiology* also had a relevant impact, indicating that scientific evidence has reached the interest of the global scientific and academic discourse, given that this journal has a high impact. In contrast, based on impact metrics and citations, multidisciplinary medical journals such as *New England Journal of Medicine*, *Circulation*, and *Journal of the American College of Cardiology* lead metrics. This can be explained by their interest in publishing multicenter randomized controlled trials and large-scale prospective studies, whose data and results have significant potential for external validity⁽²⁸⁾. Consequently, there are Latin authors who contribute to these consortia and provide primary data from the Latin population, generating high-impact studies. The steady growth in this research topic is reflected in the increase in the production of *Arquivos Brasileiros de Cardiologia*, which led the publication peaks in the evaluated period. This growth also correlates with Brazil's leadership position in research in the region, as this journal is national.

Despite Brazil, its authors, and universities, especially the *Universidade de São Paulo* and the *Universidade Federal de São Paulo*, having a significant proportion of the identified global production, Argentina and Mexico also stand out due to some authors and affiliations. However, it would be interesting to delve into the specific subareas or topics in which each institution or country leads, although this analysis is beyond the scope of the methodology used. Despite these differences, it means that, unlike Brazil, there are other countries that can be contributors and/or potential leaders in research in some subareas of heart failure in Latin America. However, a clearer direction is needed from leading institutions and scientific societies, as some countries and institutions have experienced disproportionate growth in recent years compared to others in the region. This reflects the need to promote and invest more in health sciences⁽²⁹⁾, especially in conditions of public health interest such as heart failure. Collaboration with high-income countries, such as the United States, Canada, and Scotland, could be the fundamental reason why Brazil leads heart failure research in the region. Its network and collaboration strength are much greater in this field of science compared to the rest of the countries in Latin America. This collaboration, whether at the national, regional, or intercontinental

level, undoubtedly can drive macroresearch projects, development, and innovation⁽²⁹⁾. Examples of this are the most cited studies conducted in Latin American institutions (excluding trials and massive collaborations), which were published in high-impact journals and have metrics in line with their scientific relevance at the international level.

Finally, when assessing the trends and transition of research lines in heart failure since 2003, a notable change related to the precision medicine trend in recent years was observed. While from 2003 to 2017, topics aimed to characterize, analyze, and investigate factors and patterns associated with certain cardiovascular diseases related to heart failure, in the last five years, there has been an intensification of data systematization and intervention testing for heart failure resolution. This change is predictable, as after a significant period of knowledge production about the target population, there is a focus on systematizing and calculating estimates that allow determining the accuracy of an intervention and defining evidence-based practices applicable to the real population⁽³⁰⁻³²⁾.

This study reveals an attractive, original, and relevant landscape in heart failure research, which can be used by researchers, research groups, state institutions, universities, and scientific societies interested in assessing what has been investigated and what needs to be researched on heart failure. Considering the gaps and pluralism in knowledge, as well as potential collaborations based on leading institutions and researchers in the region, the use of bibliometric resources⁽³³⁻³⁶⁾ is essential for designing an evidence-based roadmap that considers investment, production, and outcome indicators in health and science.

In conclusion, this study identified growth in heart failure research in Latin America over the past 20 years, with Brazil and some of its universities leading this trend. Argentina and Mexico also stand out for their impact and pluralism in research. Broad collaboration, especially with high-income countries, seems to be key in driving and advancing research in this area, with Brazil being the most influential country in the region. Additionally, sustained interest in certain topics related to the causes or patterns of heart failure was observed, with a recent transition toward a significant interest in data systematization and resynchronization therapy.

Author contributions

Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Writing - Review & Editing: GBM, GAGP, ERP, PJBC, KTRR, CMZV, YLSU, AFAR, YAPJ.

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