

ORIGINAL RESEARCH:

How has colorectal cancer research evolved in Latin America? Bibliometric analysis

¿Cómo ha evolucionado el la investigación en cáncer colorrectal en Latinoamérica? Análisis bibliométrico

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Abstract

Introduction: Colorectal cancer (CRC) has become one of the leading causes of morbidity and mortality worldwide. Research in CRC has evolved beyond a purely clinical perspective, integrating new tools with the potential to uncover innovative solutions. However, the evolution of CRC research in the region has not been thoroughly studied. Therefore, the aim of this study was to characterize the evolution of CRC research in Latin America. **Methods:** A cross-sectional bibliometric study was conducted using Scopus as the data source. Results: A total of 2,375 scientific documents were selected, of which 77.7% (n=1,847) were original articles, followed by reviews (13.47%; n=320). An international collaboration rate of 33.6% was identified. Brazil has been the most prolific country in CRC research (n=1,284 documents), followed by Mexico (n=307) and Argentina (n=208). CRC research in Latin America has been related to cancer staging, prognosis, Fluorouracil, adenocarcinoma, and treatment outcomes. Since 2000, the most relevant topics have been cancer staging, antineoplastic agents, and survival. Conclusions: CRC research has gradually evolved in the region, predominantly led by Brazil, followed by Mexico and Argentina. The output has primarily been based on primary data. Clinical research, focusing on outcome assessment, staging, and survival, has been the most common. However, the study of antineoplastic agents and the inclusion of basic research are emerging trends in the region.

Keywords: Colorectal Neoplasms. Rectal Neoplasms. Colonic Neoplasms. Biomedical Research. Bibliometrics. Latin America.

Resumen

Introducción: El cáncer colorrectal (CCR) se ha convertido en una de las principales causas de morbilidad y mortalidad a nivel mundial. El enfoque de la investigación en salud en CCR ha evolucionado más allá de la visión clínica, integrando nuevas herramientas con el potencial de descubrir soluciones novedosas. Aún, no se ha estudiado a profundidad la evolución de la investigación del CCR en la región. Entonces, el objetivo de este estudio fue caracterizar la evolución de la investigación del CCR en Latinoamérica. **Métodos:** Se llevó a cabo un estudio bibliométrico de corte transversal, que utilizó Scopus, como fuente de datos. **Resultados:** Fueron seleccionados 2375 documentos científicos, de los cuales, el 77,7% (n=1847) fueron artículos originales, seguido de revisiones (13,47%; n=320). Se identificó una colaboración internacional del 33,6%. Brasil ha sido el país más prolífico en CCR (n=1284 documentos), seguido de México (n=307) y Argentina (n=208). El estudio del CCR en Latinoamérica ha estado relacionado a la estadificación del cáncer, pronóstico, Fluorouracilo, adenocarcinoma y desenlace de tratamiento. A partir del año 2000, los tópicos más relevantes han sido la estadificación del cáncer, agentes antineoplásicos, y supervivencia. **Conclusiones:** La investigación en CCR ha evolucionado paulatinamente en la región, liderada esencialmente por Brasil, seguido de México y Argentina. La producción generada ha sido principalmente a expensas de datos primarios. La investigación clínica, enfocada en la evaluación de desenlaces, estadificación y supervivencia, ha sido la más común. No obstante, el estudio de antineoplásicos e inclusión de investigación básica, es emergente en la región.

Palabras clave: Neoplasias Colorrectales. Neoplasias del Recto. Neoplasias del Colon. Investigación Biomédica. Bibliometría. Latinoamérica.

Introduction

Colorectal cancer (CRC) has become one of the leading causes of morbidity and mortality worldwide (1,2). This type of cancer, which affects both the colon and rectum—key components of the digestive system—exhibits an increasing prevalence that necessitates the generation of new knowledge regarding its mechanisms, risk factors,

and preventive strategies. Given that genetics, epigenetics, and lifestyle play critical roles in the pathophysiology and progression of CRC (3) — and that these factors vary across populations—it is essential to determine the characteristics and scope of local and regional research on CRC (3).

Despite significant advances in diagnosis and treatment, CRC continues to pose a substantial challenge for healthcare systems, biomedical professionals, and researchers (4). Consequently, the focus of CRC health research has shifted beyond the traditional clinical approach, incorporating omics-based tools that have enabled the integration of translational knowledge to address clinically relevant research questions from a laboratory perspective (5). This integration involves disciplines such as genetics, genomics, proteomics, and metabolomics, which contribute to the prediction and prevention of disease onset and severity, as well as the identification of personalized biomarkers applicable to specific populations. Until now, the evolution of CRC research in Latin America has not been thoroughly examined (4,6). Such analysis would reveal knowledge gaps and opportunities and inform the development of new research directions grounded in the limitations of previous efforts. Therefore, the objective of this study was to characterize the evolution of CRC research in Latin America.

Methodology

A cross-sectional bibliometric study was conducted using Scopus as the data source. As the largest database of peer-reviewed scientific literature, Scopus has been widely justified and supported for this type of analysis (7-9).

To retrieve the relevant documents, a semi-structured search strategy was designed and executed. This strategy was developed using health science descriptors and their synonyms in both English and Spanish. After conducting pilot tests, the final strategy was selected based on the precision of the results. The search query used was as follows: TITLE (“Colorectal Neoplasms”) OR TITLE (“Colorectal Tumor”) OR TITLE (“Colorectal Cancer”) OR TITLE (“Colorectal Carcinoma”) OR TITLE (“Colonic Neoplasms”) OR TITLE (“Sigmoid Neoplasm”) OR TITLE (“Rectal Neoplasm”) OR TITLE (“Rectal Cancer”) OR TITLE (“Rectal Tumor”) 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).

Once the search results were obtained, they were exported in .CSV format for manual review, duplicate removal, and application of inclusion criteria. Documents were included if they met the following conditions: 1) The topic of the study was explicitly focused on CRC; 2) Full-text availability was confirmed; and 3) At least one author had a Latin American institutional affiliation. No exclusion criteria were applied. The search was reproduced on August 1, 2024.

To characterize and visualize the results, thematic and collaboration networks were constructed, and indicators of scientific growth and impact were calculated. This analysis was performed using the Bibliometrix package in R (version 4.3.1) (10). Frequency and percentage calculations were carried out using Microsoft Excel 2016.

Ethical statements

This study did not require ethical approval, as it did not involve research with human subjects, biological models, or the use of clinical records.

Results

A total of 2,375 scientific documents were selected after applying the inclusion criteria. The first publication was recorded in 1937, establishing an 87-year analysis window up to 2024. Scientific output

has primarily consisted of original research articles (77.77%; n = 1,847), followed by review articles (13.47%; n = 320). An international collaboration rate of 33.6% was identified (Table 1).

From the earliest publications, a modest trend was observed until the 1980s, when a steady increase in publications on CRC became evident. In recent years, however, a sustained decline in the number of publications has been noted (Figure 1). This trend contrasts with the number of citations, which initially showed fluctuation but has demonstrated a notable increase in recent years (Figure 1).

Brazil has been the most prolific country in CRC research (n = 1,284 documents), followed by Mexico (n = 307) and Argentina (n = 208). Similarly, Brazil produced the highest impact publications, reflected in an h-index of 79, followed by Argentina with an h-index of 44. Among the most productive institutions in the region, the Universidade de São Paulo stands out with 357 scientific publications, followed by the Universidade Federal de São Paulo (98) and the A.C. Camargo Cancer Center (92). The Universidade de São Paulo also achieved the highest impact, with an h-index of 57.

The Journal of Coloproctology published the highest number of CRC-related articles (n = 61) (Figure 2-A), while Diseases of the Colon and Rectum accumulated the most citations (n = 2,958) (Figure 2-B). In terms of impact, Diseases of the Colon and Rectum ranked highest according to the g-, h-, and m-indices (Figure 2-C). The Journal of Coloproctology demonstrated the most remarkable growth over time, with significant peaks beginning in 2011 (Figure 2-D).

Regarding collaboration networks, Brazil showed the highest number of collaborative efforts, particularly with countries such as the United States and Germany, and significantly within Latin America, especially with Argentina (Figure 3-A). The Angelita & Joaquim Gama Institute demonstrated the most robust collaboration network, particularly at the national level with the Universidade de São Paulo (Figure 3-B).

In terms of research patterns and thematic trends, keyword cloud visualizations revealed that CRC research in Latin America has been strongly associated with cancer staging, prognosis, fluorouracil, adenocarcinoma, and treatment outcomes (Figure 4-A). From the 1980s onward, research began to

focus on associations with methotrexate, biomarker exploration (CA 19-9), and exon analysis (Figure 4-B). Since the year 2000, the most prominent topics have included cancer staging, antineoplastic agents, and cancer survival (Figure 4-C). The thematic map revealed that the main research niches have converged on retrospective studies, early cancer detection, risk factors, colonoscopy use, and cellular proliferation (Figure 4-D).

Discussion

This analysis provided an innovative perspective on the scientific evolution of health research on CRC in Latin America. Previous studies have examined various aspects of this disease; however, most were conducted in association with other conditions—such as metabolic syndrome (11)—or focused on the application of specific techniques, including radiomics (12), artificial intelligence (13), or immunotherapy (14). Given that the genetic and epigenetic profiles of populations are closely linked to cancer behavior, accurately understanding these characteristics is essential for developing precision medicine approaches that support transformative innovation applicable to local communities (15-18).

In comparison with bibliometric studies that used global scientific production as their unit of analysis (11-14), only Brazil has stood out in Latin America in terms of both output and collaboration, accounting for the largest proportion of CRC-related scientific publications in the region. While global CRC research trends have primarily focused on classification, staging, outcome evaluation, and basic science related to inflammation, potential therapeutic targets, and biomarkers (11-14), research in Latin America has been dominated by clinical studies, also addressing clinical outcomes, staging, and the evaluation of biological therapies. Basic and translational research has emerged only recently as a growing area of interest (19).

Although the growth of research and collaboration in the region has been more gradual, it remains significant when compared to other parts of the world. Given that the United States and Germany are among the countries with the highest volume of CRC publications (11-14), it is not surprising that they are also the primary international collaborators for Latin American countries, especially Brazil and Argentina. This dynamic may help explain why these two Latin American nations lead in regional scientific output and have achieved higher citation

impact.

An important point of discussion is that several Latin American journals account for a substantial portion of the region's CRC-related publications. Over time, these journals have accumulated a noteworthy number of citations, highlighting the relevance of considering regional or local journals as viable publication outlets. As long as the quality of the evidence remains high, impactful and visible contributions can be achieved through these platforms. Although such patterns are often overlooked in global-level analyses, regional disaggregation reveals the positioning of local journals relative to more prestigious international options typically selected by researchers.

Nonetheless, the evolution of CRC research appears to be aligned with local needs and is driven by the scientific and technological capacity of each country. This should not be viewed as a limitation, but rather as a context for developing high-quality research despite existing barriers—a goal supported by various regional organizations and international research consortia (20-22).

As for limitations, it must be noted that this study was restricted to describing regional patterns and trends, and thus the findings should be interpreted within that context. Additionally, the use of a single database limited the inclusion of a broader volume of relevant evidence.

Conclusion

Research on CRC has gradually evolved in the region, led primarily by Brazil, followed by Mexico and Argentina. Most of the scientific output has been based on primary data, with international collaboration present in approximately three out of every ten publications. The collaboration network has been spearheaded by Brazil, which has established strong partnerships with the United States and Germany.

Clinical research—particularly studies focused on outcome evaluation, cancer staging, and survival—has been the most prevalent. However, research on antineoplastic agents and the inclusion of basic science approaches are emerging as growing areas of interest in the region.

Peer Review

The manuscript was peer-reviewed and approved

by the INSPILIP Editorial Board.

Availability of Data and Materials

The data supporting this manuscript are available upon request from the corresponding author.

Conflicts of Interest of Each Author

None of the authors have any conflicts of interest.

Author Contributions

The authors conducted the various phases of the research, and they contributed equally throughout the process.

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Annexes

	Frequency	Percentage
Authors		
Authorship	15,021	
Authors of single-authored documents (N = 15,021)	89	0,59
Article Type		
Original research article	1847	77,77
Review	320	13,47
Book	2	0,08
Book chapter	26	1,09
Conference paper	29	1,22
Editorial	31	1,31
Short survey	4	0,17
Letter	81	3,42
Retraction	1	0,04
Note	34	1,43
Collaboration		
Single-authored articles	89	-
Average number of co-authors per article	9,3	-
International co-authorship	-	33,6
Average article age (in years)	6	-
Average citations per document	20,75	-
Keywords	3894	-
Scientific sources	779	-

Table 1. Overview of Latin American scientific output on colorectal cancer (N=2375).

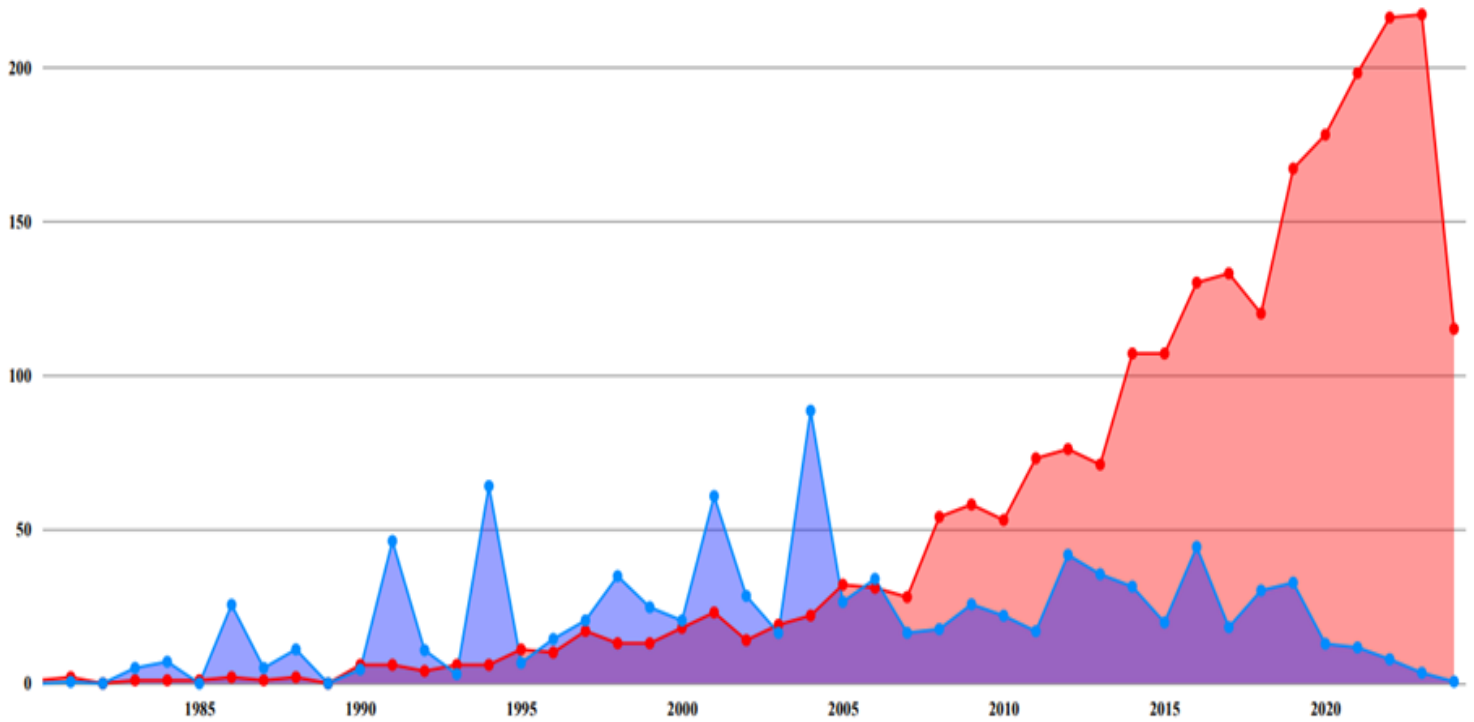


Figure 1. Annual scientific evolution of Latin American research on colorectal cancer. Red line: Annual publication frequency. Blue line: Average number of citations per article per year.

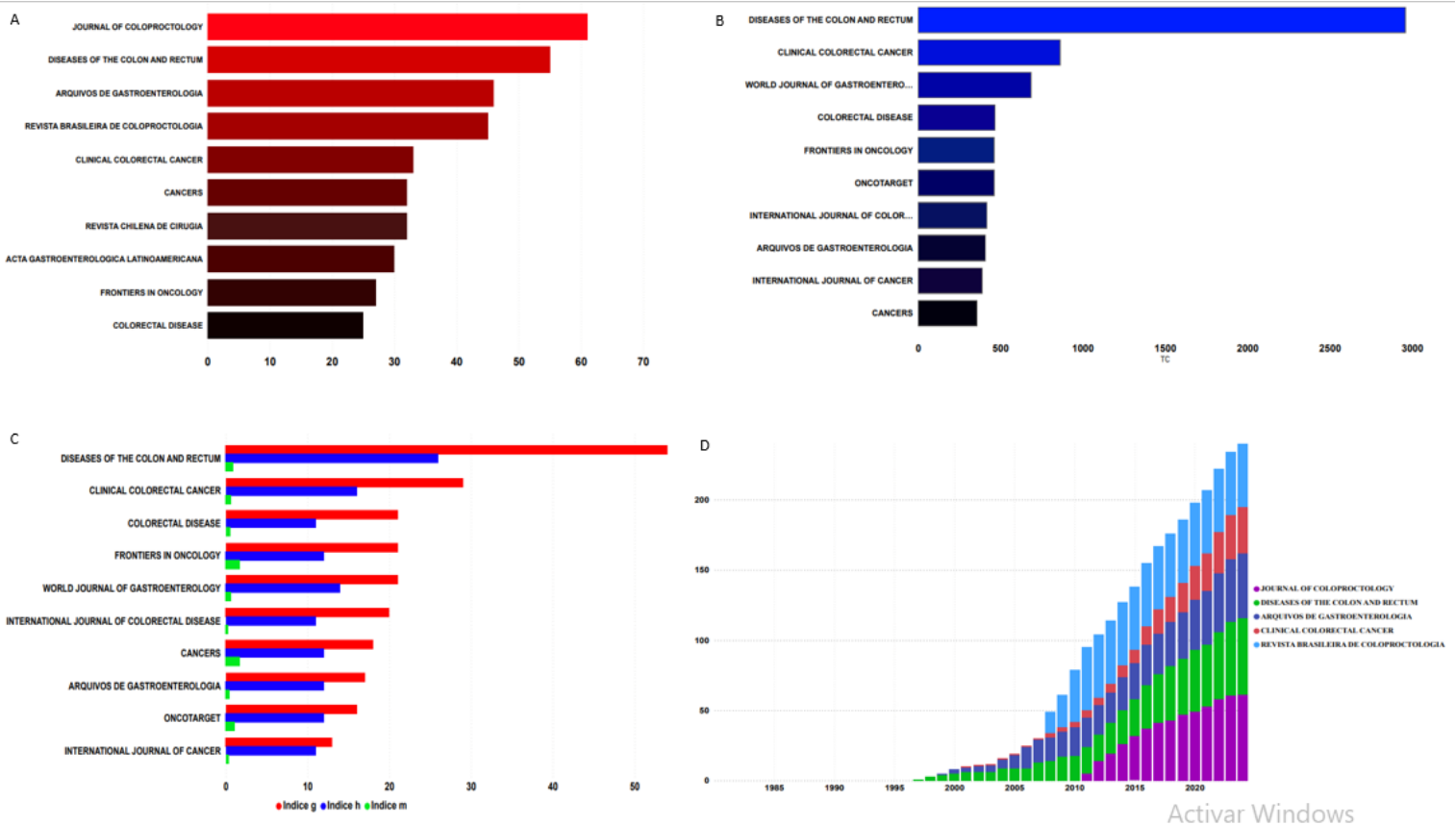


Figure 2. Citations and scientific impact of journals with the highest number of Latin American scientific articles on colorectal cancer. A. Frequency of published articles. B. Total citations received by journals. C. h-, g-, and m-indices reported by journals. D. Cumulative volume of publications over time in the top 5 journals with the most Latin American articles on colorectal cancer.

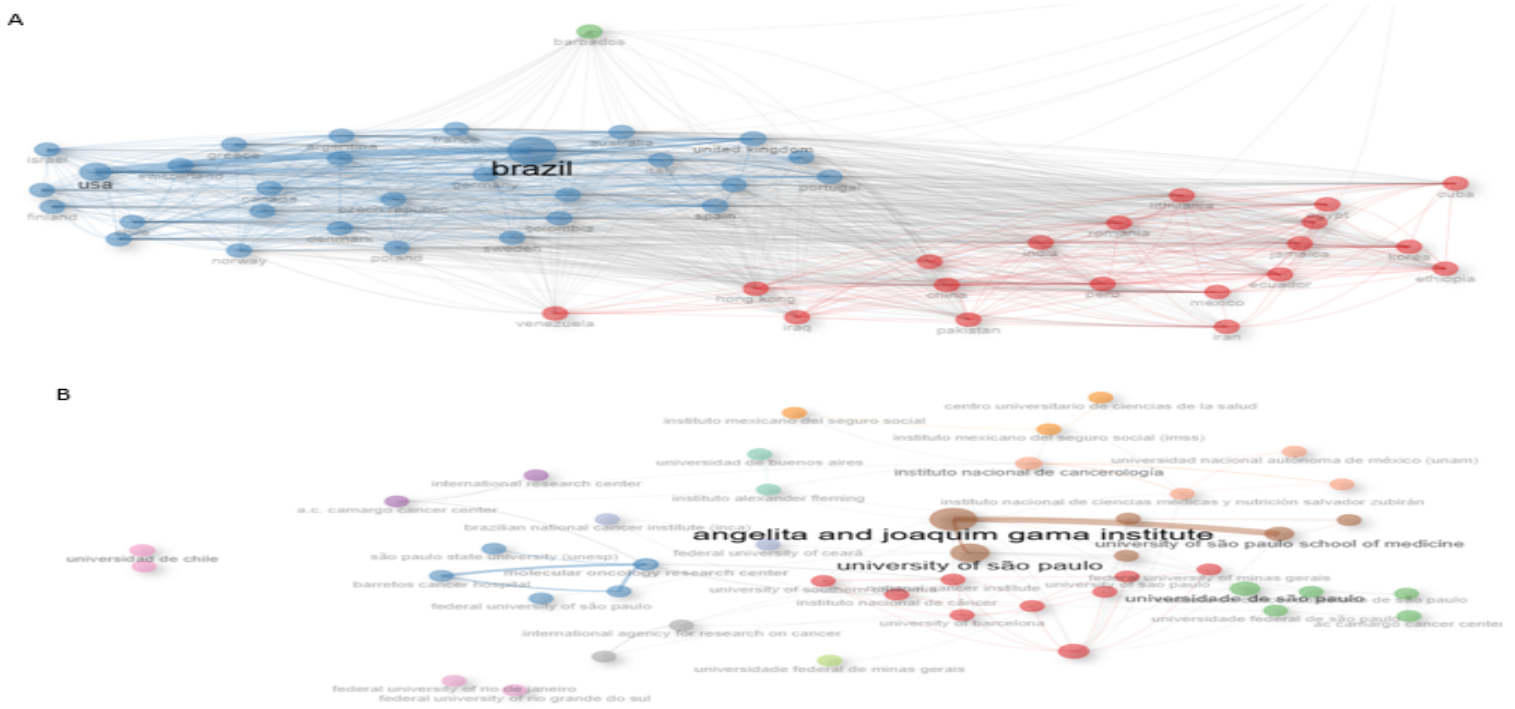


Figure 3. International scientific collaboration networks in Latin American research on colorectal cancer. A. Collaboration Between Countries. B. Collaboration Between Institutions.

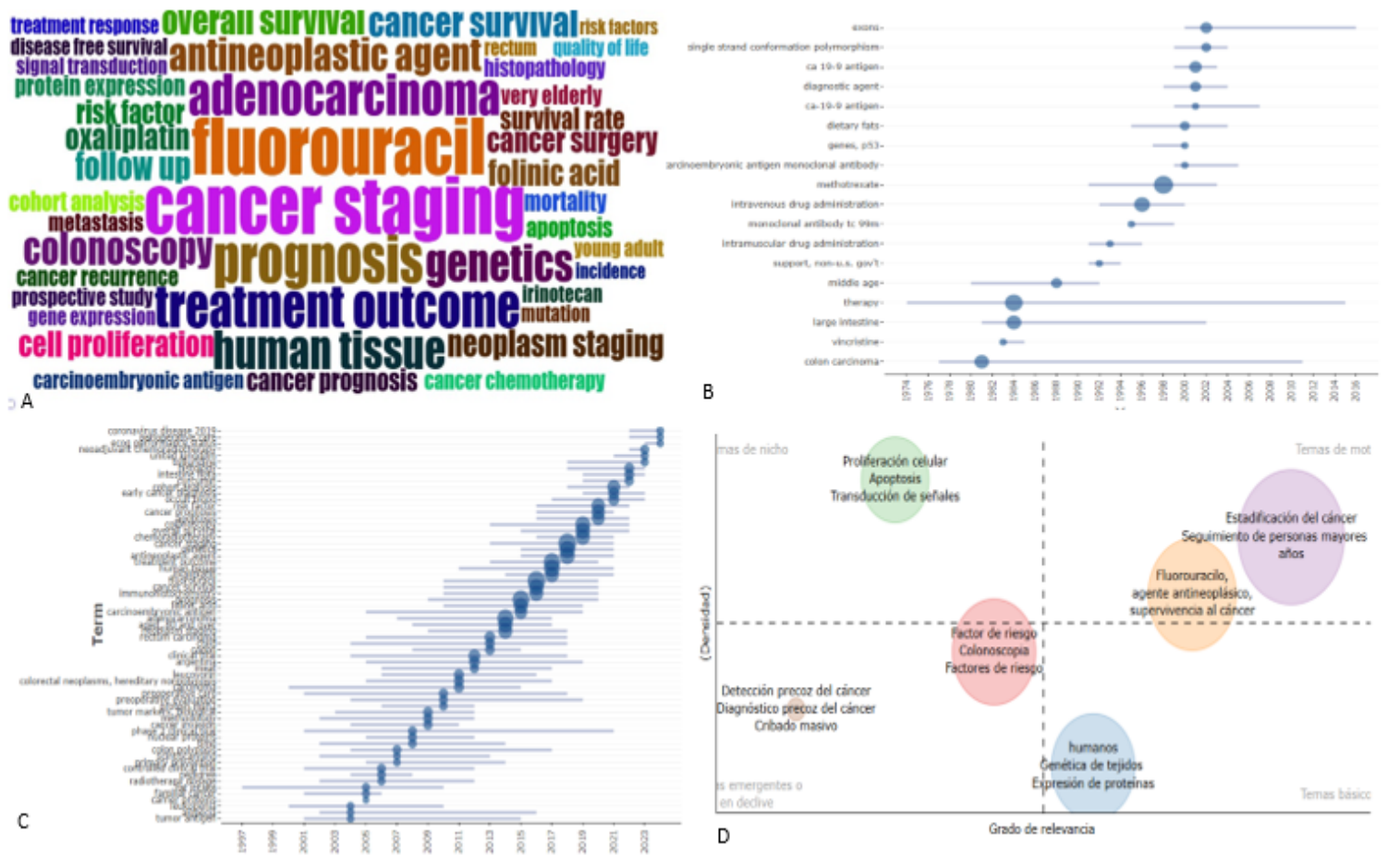


Figure 4. Latin American research patterns and thematic evolution over time in colorectal cancer studies. A. Most frequent keyword bigrams (word cloud). B. Most frequently studied topics from 1980 to 2002. C. Most frequently studied topics since 2003. D. Thematic map of the most relevant research niches.