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RESEARCH ARTICLE

# Analysis of Cuban scientific production and citations in Scopusindexed dental journals (2000-2024)

# Análisis de la producción científica cubana y citaciones en revistas de estomatología indexadas en Scopus (2000-2024)

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#### RESUMEN

Antecedentes: La producción científica en ciencias odontológicas es crucial para avanzar en el conocimiento y los tratamientos. El análisis bibliométrico evalúa el impacto de la investigación, lo que ayuda a la asignación de recursos y a la formulación de políticas. Si bien las citas y las métricas de las revistas son importantes, el énfasis excesivo en la cantidad sobre la calidad puede comprometer la integridad científica.

Objetivo: Describir la producción científica cubana y las citas en revistas de odontología indexadas en Scopus desde el año 2000 hasta el 2024.

Métodos: Se realizó un análisis bibliométrico de la investigación odontológica cubana en Scopus desde 2000 hasta 2024. Los artículos se clasificaron por tema, fuente de publicación y citas. El análisis estadístico incluyó ANOVA y correlación de Spearman para evaluar las relaciones entre las citas, las áreas temáticas y las fuentes de publicación. Además, el estudio examinó las tendencias de las publicaciones odontológicas cubanas y su impacto internacional. Resultados: Un total de 670 artículos de odontólogos cubanos cumplieron con los criterios de inclusión. La Revista Cubana de Estomatología fue la principal fuente de publicación, con 77,0 % de los artículos. Revistas internacionales como la Journal of Periodontology tuvieron las tasas de citación más altas, con un promedio de 278,0 citas por artículo, en comparación con 1,4 citas de la revista cubana. La periodoncia fue el área temática más citada, con una media de 14,4 citas, y representó el 7,8 % del total. Se encontraron correlaciones significativas entre las citas y las fuentes de publicación (p < 2.2e-16) y las áreas temáticas (p = 2.205e-05).

Conclusiones: La investigación odontológica cubana es abundante en revistas nacionales, pero tiene espacio para un mayor impacto internacional. Las especialidades, como la periodoncia, muestran un mayor potencial de reconocimiento mundial. La elección de la revista y el área de investigación influyó significativamente en el impacto de las publicaciones odontológicas cubanas. Se recomiendan opciones estratégicas de publicación y colaboraciones internacionales para mejorar la visibilidad y el impacto de las citas.

Palabras clave: Cuba; bibliometría; altmétricas; investigación dental; bases de datos bibliográficas; odontología.

#### **ABSTRACT**

Background: Scientific production in dental sciences is crucial for advancing knowledge and treatments. Bibliometric analysis evaluates research impact, aiding resource allocation and policy-making. While citations and journal metrics are important, overemphasis on quantity over quality can compromise scientific integrity.

Objective: To describe Cuban scientific production and citations in dentistry journals indexed in Scopus from 2000 to 2024.

**Methods:** A bibliometric analysis of Cuban dental research in Scopus from 2000 to 2024 was conducted. Articles were categorized by topic, publication source, and citations. Statistical analysis included ANOVA and Spearman correlation to assess relationships between citations, subject areas, and publication sources. Also, the study examined trends in Cuban dental publications and their international impact.

Results: A total of 670 articles by Cuban dentists met the inclusion criteria. The Revista Cubana de Estomatología was the primary publication source, with 77.0% of the articles. International journals such as the Journal of Periodontology had the highest citation rates, with an average of 278.0 citations per article, compared to 1.4 citations for the Cuban journal. Periodontology was the most cited subject area, averaging 14.4 citations, and represented 7.8% of the total. Significant correlations were found between citations and both publication sources (p < 2.2e-16) and subject areas (p = 2.205e-05).

Conclusions: Cuban dental research is abundant in national journals but has room for increased international impact. Specialties, such as periodontology, show a higher potential for global recognition. The choice of journal and research area significantly influenced the impact of Cuban dental publications. Strategic publication choices and international collaborations are recommended to enhance visibility and citation impact.

Keywords: Cuba; bibliometrics; altmetrics; dental research; databases, bibliographic; dentistry.

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### **INTRODUCTION**

The observation of scientific production in medical sciences is crucial for advancing knowledge, technologies, and treatments that have a significant social impact. Quantitative evaluation of scientific output allows for the assessment of scientists, laboratories, and institutions, which contribute in resource allocation and policy formulation. The emergence of alternative metrics, such as altmetrics, complements traditional bibliometrics, providing a more comprehensive assessment of research impact and societal influence. However, the current emphasis on bibliometric measures, such as publication count and journal impact factors, may lead to a focus on quantity over quality, which could compromise the integrity of the scientific literature. Therefore, implementing rigorous and diverse metrics that prioritize quality, reproducibility, and innovation is essential to ensure the advancement of medical sciences while maintaining scientific integrity.

Citations play a crucial role in scientific research by establishing the current state of knowledge, identifying gaps in the literature, and validating research results. (6) Journals act as sources, storers, and synthesizers of knowledge communication, and their importance is often assessed based on the number of citations received, their assimilation of knowledge, and the role they play in maintaining order in the scientific community. (7) However, relying on metrics to evaluate journals does not always reflect the real impact of individual articles and can lead to bias and scientific misconduct. (8,9) To ensure the integrity of scholarly communication, authors, reviewers, and editors must collaborate to promote ethical citation practices and improve the quality and indexing of scholarly journals. (10)

In Cuba, especially related to Oral Health Sciences, Corrales et al have studied scientific production in previous years, including periods dating back to the end of the last century. (11,12,13) However, in the last five years, a distribution of the Cuban dental science movement in relation to citations in the scientific literature has not been observed. Thus, this study aims to address this gap by describing Cuban scientific production and citations in dental journals indexed in Scopus in the period 2000-2024

# **METHODS**

A cross-sectional, descriptive observational study was conducted through a bibliometric analysis of Cuban scientific production indexed in Scopus in the Dentistry category from 2000 to 2024. Papers in Spanish and English were included. The research was conducted from April to July 2024 at the University of Medical Sciences of Havana, Cuba and the Universidad Autónoma de Chile. The bibliometric indicators examined included the number of articles, publication sources, thematic areas within dentistry, year of publication, and citations. Given that Scopus does not uniformly define thematic areas within dentistry, the recovered articles were classified by topic based on their titles or abstracts.

The topics were categorized as follows:

- Preventive dentistry: related to the prevention of dental caries, periodontal health, education, and promotion of oral health.
- Restorative dentistry: related to dental materials, restorative techniques, and dental caries treatment.
- Endodontics: related to the treatment of root canals, pulp and periapical pathologies, and diagnostic and treatment techniques.
- Periodontics: periodontal diseases, periodontal therapies, and regeneration.
- Orthodontics: related to the correction of malocclusions, orthodontic techniques, appliances, and dental aesthetics.
- *Prosthodontics*: fixed and removable dental prostheses, dental implants, aesthetics, and prosthetic function.
- Oral and maxillofacial surgery: surgical extractions, treatment of facial fractures, and orthogonathic surgery.
- *Pediatric dentistry*: Dental development and orthodontics, and prevention and management of dental caries.
- Oral pathology and oral medicine: Related to the diagnosis of oral lesions, systemic diseases with oral manifestations, and oncology.
- Geriatric dentistry: Related to dental care in older adults, treatments adapted to geriatric patients, and common oral diseases in old age.
- Aesthetic dentistry: related to teeth whitening, aesthetic veneers and crowns, and aesthetic contouring.
- Research in biomaterials and pharmaceuticals: Related to the development of new dental materials, biocompatibility of materials, and innovations in dental technology. Additionally, research has been related to pharmacology.
- Dental public health: Related to epidemiological studies, oral health policies and community dental health programs. Articles that contributed to dental education were also included.
- Laser therapies and advanced technologies: Related to the use of lasers in dentistry, new technologies



and their clinical application and innovations in diagnosis and treatment.

• History of dentistry: Related to personalities and historical events of dentistry

Calibration was performed between the authors for the evaluation of the articles to be selected, in order to classify them correctly and avoid bias. The degree of coincidence among the evaluations carried out by the reviewers was performed by the *Orwin*'s method (1994). A Kappa statistic was used to measure the agreement between the reviewers who would make simple decisions about article inclusion/exclusion. Kappa values of 0.40-0.59 were considered to reflect acceptable agreement, 0.60-0.74 adequate agreement, and 0.75 or more, excellent agreement.

A search in the Scopus database was performed using a formulation that delimited articles by authors with Cuban affiliations from 2000 to 2024, within the thematic area of Dentistry, and included journal articles and reviews, encompassing case presentations. The inclusion criteria were established as follows:

AFFILCOUNTRY (Cuba) AND PUBYEAR > 1999 AND PUBYEAR < 2025 AND (LIMIT-TO (SUBJAREA, "DENT")) AND (LIMIT-TO (DOCTYPE, "ar") OR LIMIT-TO (DOCTYPE, "re"))

The retrieved articles were organized in an Excel spreadsheet and processed using RStudio® (2024.12.0 Build 467). Manual filtering of titles was necessary to ensure relevance to Dentistry.

#### Statistical analysis

An analysis of variance (ANOVA) was performed to determine whether the number of citations was significantly related to subject area and publication source. If data did not meet the ANOVA assumptions, the Spearman correlation test was applied. A 95% confidence interval (CI) was used.

To verify the ANOVA assumptions, a Residue Normality test was conducted. If the QQ plot indicated that the points followed a straight line and the Shapiro-Wilk test was not significant (p > 0.05), then the residuals were considered normal. Additionally, the homogeneity of variances was assessed using Levene's test (p > 0.05), ensuring homogeneous variances. Independence of observations was also confirmed. The dataset for the reproducibility of data processing is available at <a href="https://doi.org/10.17632/grhpnfnvvf.3">https://doi.org/10.17632/grhpnfnvvf.3</a>. (14)

#### **RESULTS**

A total of 1104 articles were initially identified, and after the filtering process, 670 articles met the inclusion criteria. The Revista Cubana de Estomatología published most of these articles, accounting for 77.0% (516/670), followed by the Revista Médica Electrónica (8.2%; 55/670) and Clinical Oral Implants Research (7,0%; 47/670). Each of the remaining journals contributed less than 2% of the total publications (table 1).

The Journal of Periodontology had the highest average citations per article, at 278.0, followed by the Journal of Dental Research (240.0) and the Journal of Oral Research (131.0). Although the Revista Cubana de Estomatología had most of the publications, it had one of the lowest average citation rates, at 1.4. Other journals with low average citations included the Revista Médica Electrónica (0.9), the Revista Española de Cirugía Oral y Maxilofacial (0.8), and Avances en Odontoestomatología (0.0) (table 1).

Articles related to periodontology had an average of 14.4 citations and accounted for 7.8% of the total. This was followed by prosthodontics with 13.6 average citations (10.4%), and preventive dentistry with 11.8 (3.6%) (table 2). The least cited topics were orthodontics (1.4 citations), history of dentistry (0.6 citations), and aesthetic dentistry (0.4 citations) (table 2).

As the assumptions of normality and homogeneity of variances for ANOVA were not met, the use of non-parametric methods for analysis was needed. The results can be accessed in the dataset available at <a href="https://doi.org/10.17632/grhpnfnvvf.3">https://doi.org/10.17632/grhpnfnvvf.3</a>. Spearman's correlation test revealed highly significant correlations between citations and publication sources (p < 2.2e-16), as well as between citations and subject areas (p = 2.205e-05) (table 3).

**Table 1** - Distribution of publishing sources and corresponding average citations per article

Source title	Articles publi- shed		Citation	
		%	% average	
Journal of Periodontal Research	1	0.2	278.0	
Journal of Dental Research	1	0.2	240.0	
Journal of Oral Research	9	1.3	131.0	
Medicina Oral, Patología Oral y Cirugía Bucal (Oral Medicine, Oral Pathology and Oral Surgery)	2	0.3	103.0	
European Journal of Oral Sciences	1	0.2	54.0	
Oral Diseases	3	0.5	35.0	
Clinical Oral Implants Research	47	7.0	25.7	
Dental Traumatology	1	0.2	24.0	
Dental Materials	2	0.3	22.0	
Journal of Dentistry	1	0.2	13.0	
Journal of Periodontology	1	0.2	12.0	
Clinical Implant Dentistry and Related Research	3	0.5	11.7	
Clinical Oral Investigations	1	0.2	10.0	
International Endodontic Journal	1	0.2	10.0	
Journal of investigative and clinical dentistry	1	0.2	10.0	
Oral and Maxillofacial Surgery	6	0.9	8.7	
Oral Surgery	1	0.2	8.0	
Journal of Oral Pathology and Medicine	1	0.2	5.3	
Community Dental Health	1	0.2	4.0	
International Journal of Oral and Maxillofacial Implants	1	0.2	4.0	
Journal of Oral and Maxillofacial Pathology	1	0.2	4.0	
Revista Cubana de Estomatología (Cuban Journal of Stomatology)	516	77.0	1.4	
Journal of Oral Rehabilitation	2	0.3	1.0	
Oral Oncology	2	0.3	1.0	
Revista Médica Electrónica (Electronic Medical Journal)	55	8.2	0.9	
Revista Española de Cirugía Oral y Maxilofacial (Spanish Journal of Oral and Maxillofacial Surgery)	5	0.8	0.8	
Avances en Odontoestomatología (Advances in Odontostomatology)	2	0.3	0.0	
Dentistry Journal	1	0.2	0.0	
Journal of Dentistry (Iran)	1	0.2	0.0	
Total	670	100.0*		

<sup>\*</sup> Deviation from 100.0% is due to percentage rounding off

**Table 2.** Distribution of articles by thematic area and corresponding average citations

			Citation average
Thematic areas	Count N Percen	Percentage %	per article
Periodontology	52	7.8	14.4
Prosthodontics	70	10.4	13.6
Preventive Dentistry	24	3.6	11.8
Research in Biomaterials and Pharmaceuticals	7	1.0	6.9
Endodontics	22	3.3	3.9
Pediatric Dentistry	36	5.4	3.6
Oral Pathology and Oral Medicine	117	17.5	3.1
Laser Therapies and Advanced Technologies	15	2.2	2.7
Restorative Dentistry	26	3.9	2.6
Oral and Maxillofacial Surgery	99	14. 8	2.4
Dental Public Health	93	13.9	2.0
Geriatric dentistry	13	1.9	1.8
Orthodontics	57	8.5	1.4
History of Dentistry	30	4.5	0.6
Aesthetic Dentistry	9	1.3	0.4
Total	670	100.0	

**Table 3.** Spearman's rank correlation for citations with publication sources and subject areas

	S	p-value	Spearman's rho
Citations and publication sources	72535279	< 2.2e-16*	-0.4470285
Citations and thematic areas	41949882	2.205e-05*	0.1631289

<sup>\*</sup> p-value, the coefficient is statistically significant at a high confidence level.



# **DISCUSSION**

This study analyzed a substantial number of articles published by authors affiliated to Cuban dental institutions, applying specific inclusion criteria to refine the sample. The findings revealed interesting patterns in terms of publication venues and their impact. The Revista Cubana de Estomatología prominently stands out as the primary publication source for Cuban dentists, followed by other national and international journals. This suggests a strong presence of Cuban dental research in local publications, which could indicate a focus on issues of national relevance or challenges in accessing high-impact international journals.

A notable disparity was observed between the number of publications and their citation impact. Specialized international journals, such as the Journal of Periodontology and the Journal of Dental Research, have significantly higher citation rates compared to local journals. This discrepancy may reflect increased visibility and international recognition of articles published in these journals, or possibly a difference in the overall quality or relevance of the research published. (15) Vaccaro et al. (16) reported that dental research in Latin America shows a considerable number of publications but a low impact in terms of citations, indicating the need to enhance scientific influence and visibility.

Periodontology emerges as the area with the greatest impact in terms of average citations, followed by prosthodontics and preventive dentistry. In contrast, areas such as orthodontics, history of dentistry, and aesthetic dentistry have received fewer citations. This could reflect global trends in dental research or specific strengths within the Cuban dental community. Bibliometric analyses have shown a significant presence of articles related to periodontics and implants in the most cited dental journals, and the main journals specializing in periodontics have steadily increased their impact factors. (17,18,19)

Spearman's correlation analysis revealed significant findings regarding the relationships between citations, publication sources, and subject areas in Cuban dental research. The significant correlations suggest that the choice of journal and research area substantially impacts the visibility and recognition of research. The correlation between citations and publication sources showed a negative rho coefficient with a very low p-value, indicating a moderate negative correlation between citations and sources with high statistical significance. This implies that certain publication sources tend to receive fewer citations, while others receive more, reflecting differences in reach, visibility, or prestige.

Studies by Porwal and Devare<sup>(20)</sup> found a positive correlation between linguistic attributes, such as the readability of abstracts and the number of references, with an increase in citations, suggesting a link between publication source and citations. Similarly, Dumas-Mallet et al.<sup>(21)</sup> concluded that the source of publication influences the number of citations received by scientific articles, especially in journals classified as influential or of high prestige. Gelzer et al.<sup>(22)</sup> argued that citation levels are related to the publication source, visibility strategies, article structure, and factors such as open access and self-citation. The strong negative correlation between citations and sources suggests that researchers could benefit from a more strategic selection of journals for publication, focusing more on those with high impact.

Regarding the relationship between citations and thematic areas, a positive rho coefficient with a statistically significant p-value was observed. This weak positive correlation indicates a slight but consistent trend where certain subject areas receive more citations than others. The statistical significance supports the validity of this observation. The results of this study are consistent with those of Feijoo et al., who concluded that topics in periodontology and implantology were the most cited in the literature. Conversely, Millones-Gómez et al. found that dental education and pediatric dentistry had the highest average citations. This suggests that certain dental specialties generate more interest and impact, guiding the allocation of resources and focus for future research projects in these high-impact areas. For local journals, especially the Revista Cubana de Estomatología, these results could motivate strategies to increase their international visibility and the impact of their publications.

The discrepancy in citations between local and international sources suggests the need for increased international collaboration to increase the reach and impact of Cuban dental research. Delli et al.<sup>(24)</sup> claimed that international collaboration in dental sciences is crucial for high-impact research,<sup>(25)</sup> and that initiatives such as joint meetings and webinars can improve the reach and impact of research internationally.<sup>(24)</sup>

Limitations of this study include the short study period (2000-2024), which may not capture long-term trends or recent changes in scientific production. (11,12) In addition, the impact measurement was based on citations, and the search was limited to authors with Cuban affiliations, which may include studies by Cuban researchers working in foreign institutions. Thus, these limitations should be taken into account when interpreting the results and could be addressed in future research to obtain broader insights into Cuban dental science production. Another limitation is that the study was focused on specific thematic journals of dentistry topic, so articles by Cuban authors from the dental guild published in multidisciplinary journals or focused on other thematic areas were lost.

These findings provide valuable insights into the publication patterns and impact of Cuban dental research, emphasizing the importance of strategic journal selection to maximize research impact and highlighting the-

matic areas for further development. They offer an empirical basis for a nuanced assessment of research impact, considering both the number of publications and their citation impact.

### **CONCLUSIONS**

This study provides a comprehensive analysis of Cuban scientific production in dentistry, indexed in Scopus from 2000 to 2024, and concludes that Cuban dental research is predominantly published in national journals such as the Revista Cubana de Estomatología, highlighting a focus on national issues. However, there is a notable disparity in citation rates, with international journals achieving higher citations and visibility. Specialties such as periodontology, prosthodontics, and preventive dentistry are the most cited, reflecting their global relevance. Significant correlations were found between citations, publication sources, and specialties, indicating the impact of journal choice and specialization on research visibility. To maximize impact, Cuban researchers should target high-impact international journals and engage in international collaborations. Addressing study limitations in future research will further improve Cuban dental scientific output. These findings emphasize strategic publication and collaboration to enhance the global impact of Cuban dental research.

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#### **CONFLICT OF INTEREST**

Alain Manuel Chaple-Gil and Kelvin I. Afrashtehfar are members of the Editorial Board of the Revista Cubana de Estomatología. For this manuscript they did not participate in the editorial process, which was carried out by other members of the Editorial Board, led by Dr Josefa Miranda-Tarragó, Editor-in-Chief of the Journal.

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