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ORIGINAL ARTICLE

Scientific production about Orthopedics, Traumatologist and Sport Medicine from cuban researchers in Scopus (2013-2022)

Producción científica sobre Ortopedia, Traumatología y Medicina Deportiva de investigadores cubanos en Scopus (2013-2022)

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RESUMEN

Introducción: Metric studies in health sciences become vitally important to know the performance of researchers, journals, hospital or educational centers in a given field.

Objective: to characterize Cuban scientific production in the area of Orthopedics and Sports Medicine in Scopus.

Methods: A bibliometric study of articles with Cuban signatories published in Scopus between 2013 and 2022 in the area of Orthopedic and Sport Medicine was carried out in SciVal to obtain the data. Cuba was selected as the country, in the period 2013-2022 and the area Orthopedic and Sport Medicine. Data were exported in Microsoft Excel worksheets in its 2019 version for further analysis.

Results: a total production of 197 manuscripts with 144 citations was observed, with a higher percentage of collaboration only between members of one institution (n=110; 55.8 %), however, the highest number of citations corresponded to international collaboration (n=60; 41.7 %), obtaining this in turn the highest rates of citations per publication (n=1.9; 54.3 %) and field-weighted citation impact (n= 0.25; 59.5 %). The year 2018 had the highest international collaboration (IC) with 28.6 %.

Conclusions: Cuban scientific production on Orthopedics and Traumatology in Scopus is low, showing a tendency to increase in the last 2 years, it is still necessary to work towards increasing the visibility and impact of these, with greater emphasis on RCOT as it is the national journal.

Palabras clave: Bibliometrics; Scientometrics; Cuba; Health Sciences; Orthopedics and Traumatology; Sports Medicine..

ABSTRACT

Introduction: Los estudios métricos en las ciencias de la salud cobran vital importancia para conocer el desempeño de los investigadores, revistas, centros hospitalarios o educativos en una esfera determinada.

Objetivo: caracterizar la producción científica cubana en el área de Ortopedia y Medicina deportiva en Scopus.

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Metodos: Se realizó un estudio bibliométrico de los artículos con firmantes cubanos publicados en Scopus entre 2013 y 2022 que respondieran al área Orthopedic and Sport Medicine.Para la obtener los datos se accedió a SciVal. Se seleccionó como país Cuba, en el periodo 2013–2022 y el área Orthopedic and Sport Medicine. Se exportaron los datos en hojas de trabajo de Microsoft Excel en su versión de 2019 para posterior análisis.

Resultados: Se observó una producción total de 197 manuscritos con 144 citaciones, con un mayor porcentaje de colaboración sólo entre miembros de una institución (n=110; 55,8 %), sin embargo, el mayor número de citaciones correspondió a la colaboración internacional (n=60; 41,7 %), obteniendo esta a su vez los mayores índices de citaciones por publicación (n=1,9; 54,3 %) y de field-weighted citation impact (n= 0,25; 59,5 %). El año 2018 fue el de mayor colaboración internacional (IC) con un 28,6 %.

Conclusiones: La producción científica cubana sobre Ortopedia y Traumatología en Scopus es baja, mostrando una tendencia al aumento en los últimos 2 años, se debe obrar aún en aras del aumento de la visibilidad e impacto de estas, con mayor énfasis en la RCOT al ser la revista nacional

Keywords: Bibliometría; Cienciometría; Cuba; Ciencias de la Salud; Ortopedia y traumatología; Medicina deportivaa

INTRODUCTION

Metrics is a branch that includes scientometric, infometric, bibliometric and altmetric studies, the latter are the most recent and generally evaluate the impact of research on social networks.

Scientific communication in health sciences is a necessity for the development of knowledge of research in the different spheres of medicine, where from a qualitative or quantitative point of view, results that contribute to the improvement of health care to the population are exposed; given that patient safety is paramount for medical care.[1,2]

Orthopedics and Traumatology is a specialty that treats disorders of the osteomyoarticular system in all ages of life,[3] the fundamental range of study of this specialty are bone disorders; where Cuba has had important exponents. At more advanced ages, the aim is to prevent diseases or to undertake actions to stop their onset.[4]

According to Scimago Journal & Country Rank (https://www.scimagojr.com/countryrank.php), Cuba occupies the sixth position in the Latin American region in terms of orthopedic production from 1996 to 2021, publishing 458 documents, 746 citations, 146 self-citations, 1.63 citations per document and an H-index of 11; which places the country in the fiftieth position globally in this area. In contrast with the position occupied, the existence of metric studies analyzing Cuban scientific production on Orthopedics and Traumatology is scarce.[5,6]

Cuban production in Scopus has been analyzed in other occasions,[7,8,9] however, on Orthopedics and Traumatology, bibliometric studies in Scopus are unknown. Horta-Martínez and Sorá-Rodríguez[5] evaluated the production on fractures in the Revista Cubana de Ortopedia y Traumatología (RCOT) -indexed in Scopus- which was low. Horta-Martínez[6] evaluated Havana's production in this journal and did not show a great production in this aspect, a counterproductive factor given that this province in Cuba enjoys a privileged position as it is the capital and hosts almost all the national and international institutes of the country.

The objective of this work is to characterize the Cuban scientific production in the area of Orthopedics and Sports Medicine in Scopus

METHODS

A A bibliometric study of articles with Cuban authors published in Scopus between 2013 and 2022 in the area of Orthopedic and Sport Medicine was carried out.

To obtain the data, SciVal was accessed. Cuba was selected as the country, in the period 2013-2022 and the area Orthopedic and Sport Medicine. The data were exported in Microsoft Excel worksheets in its 2019 version for later analysis.

The indicators were used to analyze the data:

- Collaboration.
- Scholarly Output total, by collaboration, years, journals, authors, topic cluster and institutions.
- Citations total, by collaboration, years, journals, authors and institutions.
- Citations per Publication by collaboration, years, journals, authors and institutions.
- Field-Weighted Citation Impact (by collaboration, years, authors and topic cluster) and Field-Weighted View Impact - is an indicator of the average citation/view impact and compares the actual number of citations/views received by a document with the expected number of citations/views for documents of the same document type, publication year and subject area. The metric is always defined with a reference to a global benchmark of 1.0 and intrinsically accounts for differences in citation accumulation over time, differences in citation/view rates for different document types, as well as subject area.
- Publications in Top Journal Percentiles - indicates the extent to which publications are present in the most cited percentiles of a universe, i.e., how many publications are in the top 10% of the most cited publications - by year.
- Outputs in Top Citation Percentiles and Outputs in Top View Percentile
- Journals
- Authors
- Source-Normalized Impact per Paper (SNIP)
- CiteScore 2022
- SCImago Journal Rank (SJR)
- Views and views per publication
- Quartile of the journal - calculated based on the CiteScore percentile; the CiteScore calculation is based on the number of citations of a journal's papers over four years, divided by the number of the same types of papers indexed in Scopus and published in those same four years - is divided into Q1 (0-25 %), Q2 (26 % - 50 %), Q3 (51 % - 75 %) and Q4 (76 % - 100 %).
- Year of the most recent publication of the authors
- H-index
- Topic cluster
- Publication share in percent of the topic cluster
- Prominence percentile of the topic cluster
- Institutions

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Given the public nature of the data, no endorsement by ethics or scientific committees was required.

RESULTS

A total production of 197 manuscripts with 144 citations was observed, with a higher percentage of collaboration only between members of one institution (n=110; 55.8 %); however, the highest number of citations corresponded to international collaboration (n=60; 41.7 %), obtaining this in turn the highest rates of citations per publication (n=1.9; 54.3 %) and field-weighted citation impact (n= 0.25; 59.5 %).(figure 1).

The year 2018 had the highest international collaboration (IC) with 28.6 %, while the year with the highest scientific output was 2022 (n=38; 18.3 %). The 2015 had the highest citation frequency (Cit) with 52 (36.1 %) being this also the year with the highest number of citations per publication (Cit per P) (n= 3.3) and the highest field-weighted citation impact (FW Cit Im) with 0.19. In 2022 an output in top citation percentiles (OTCit Perc) of 2.6 % was reported to have the first place in this index -it was the only year where this variable had a value greater than 0-; 6.3 % of publications in top journal percentiles (PTJ Perc) was reported in 2017. (figure 2)

Fig 1. % of Collaboration, scholarly output, citations, citations per publication and field-weighted citation impact.

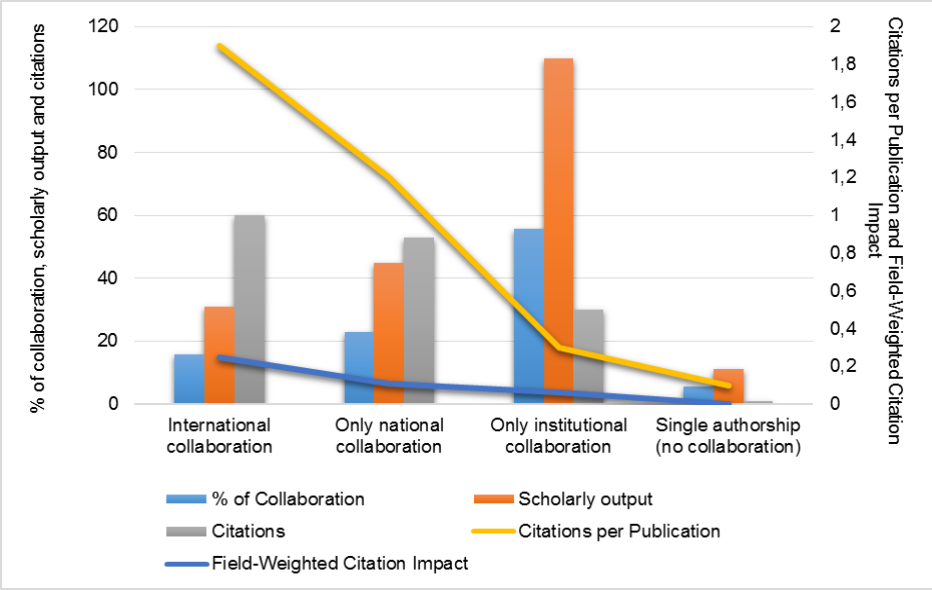

Table 1 shows the journals where Cuban researchers published, where the one with the highest number of manuscripts is RCOT; regarding the number of citations the journal BMC Musculoskeletal Disorders obtains the first place (n=32); Journal of Shoulder and Elbow Surgery obtained the highest SNIP (n=1,816), SJR (n=1,666); regarding the CiteScore, the Journal of Science and Medicine in Sport and the Scandinavian Journal of Medicine and Science in Sports shared the leadership with 7,8.

The year 2017 obtained the highest number of views (n=598) and views per paper (VpP) (n=37.4); the year with the highest outputs in top views percentiles (top 10%) (OTPV Perc) was 2020 with 12,5; as for the field-weighted view impact (FWVI) the predominant year was 2017 with 1,34; 2022 was the year with the highest number of publications (n=38) with the highest representation of publications in journals belonging to quartile (Q) 4 (Figure 3).

Table 2 shows the authors (n=13) who had more than 10 citations, among which are Carvajal Veitia W, González-Carbonell RA and Cisneros Hidalgo YA with 3 published manuscripts. As for the year of their most recent publication, Carvajal Veitia W and Ríos-Garit J are reported as the most recent in 2021; those with the highest number of citations with 32 each are Chico-Capote

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Fig 2. International collaboration, scholarly output, citations, field-weighted citation impact, outputs in top citation percentiles, publications in top journal percentiles and citations per publication per year.

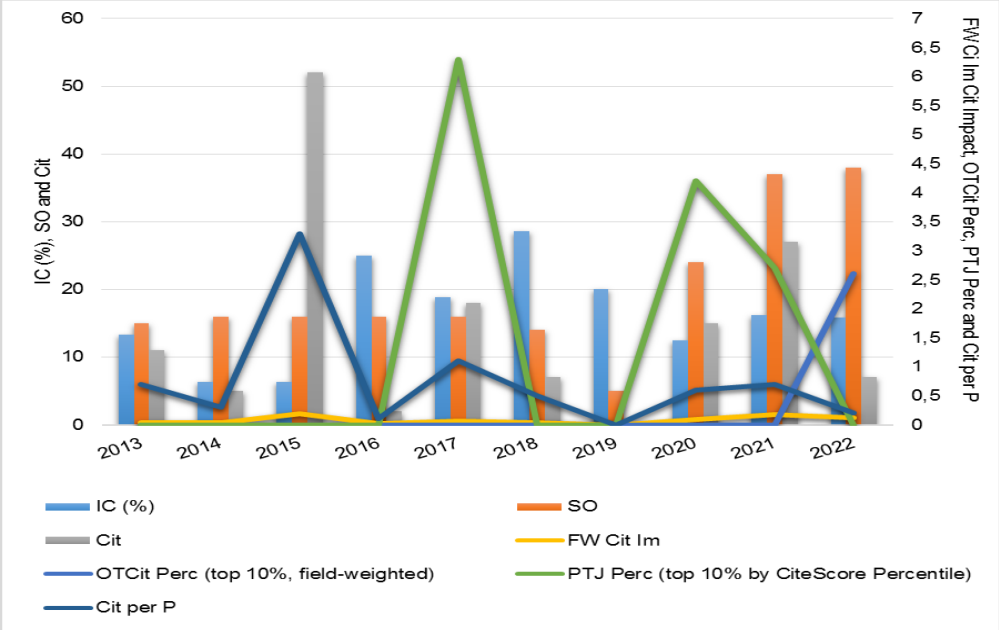

Table 1 - Journals according to publications, citations, authors, citation per publication, source-normalized impact per paper, CiteScore 2022 and SCImago journal rank..

Journals*	Publications	Citations	Authors	Citations per Publication	SNIP	CiteScore 2022	SJR
Revista Cubana de Ortopedia y Traumatologia	167	28	374	0,2	0,144	0,1	0,126
Archivos de Medicina del Deporte	4	12	12	3	0,213	0,5	0,148
Retos	4	9	3	2,3	0,805	2,8	0,34
Medicina dello Sport	3	1	6	0,3	0,333	1,2	0,227
BMC Musculoskeletal Disorders	2	32	13	16	1,288	3,5	0,716
Journal of Sport and Health Research	2	2	2	1	0,288	1,5	0,195
Journal of Science and Medicine in Sport	1	9	1	9	1,612	7,8	1,324
Scandinavian Journal of Medicine and Science in Sports	1	4	1	4	1,602	7,8	1,331
Journal of Shoulder and Elbow Surgery	1	1	4	1	1,816	6,1	1,666
Chinese Journal of Traumatology - English Edition	1	1	1	1	1,302	3,4	0,418
Injury	1	0	1	0	1,354	3,7	0,698
Apunts Medicina de l'Esport	1	1	5	1	-	-	-
Revista Española de Cirugia Ortopedica y Traumatologia	1	2	1	2	0,495	1,2	0,274
Revista Andaluza de Medicina del Deporte	1	4	5	4	0,113	0,4	0,14
International Journal of Performance Analysis in Sport	1	3	3	3	1,49	4,4	0,83
Journal of Orthopaedics	1	16	2	16	0,793	2,5	0,57
Global Spine Journal	1	6	5	6	1,572	5	1,043
Orthopaedic Journal of Sports Medicine	1	0	1	0	1,245	4	1,113
Sport TK	1	0	7	0	0,332	0,7	0,168
Apunts Sports Medicine	1	9	5	9	0,407	1,9	0,243
Frontiers in Sports and Active Living	1	4	1	4	0,751	1,6	0,624

Note: *The authors keep the name of the journals as same appear in Scopus; SNIP: Source-Normalized Impact per Paper; SJR: SCImago Journal Rank.

A, Estévez del Toro MH, Enrique Guillen G, the latter also has the highest h-index (n=32). In terms of citations per publication, there are 4 authors with 21 and the highest field-weighted citation impact is Soto-Valero C with 0,74.

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Fig 3. Views, outputs in top views percentiles, views per paper, field-weighted view impact and quartil

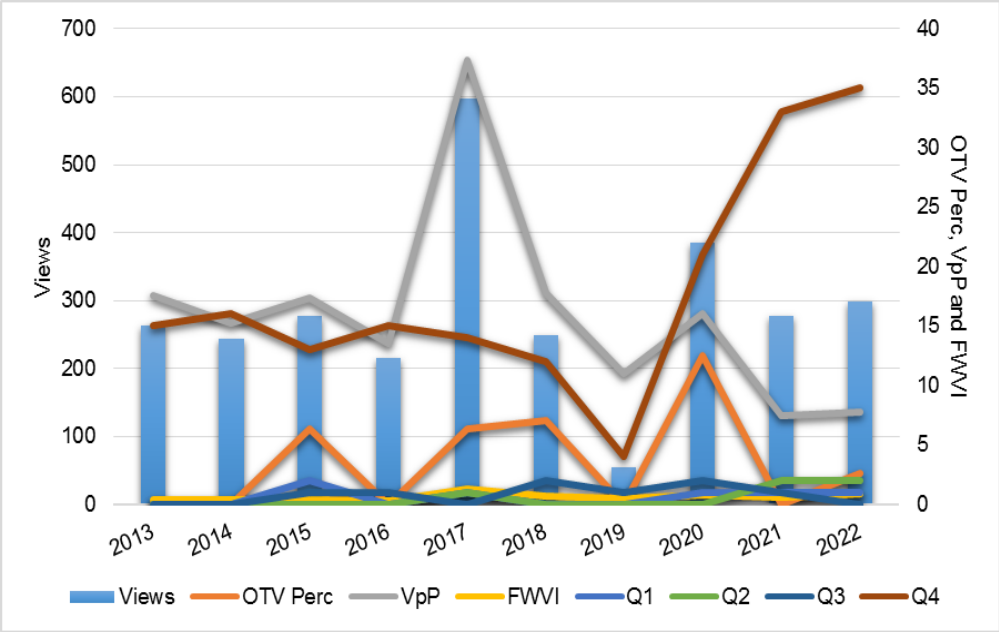

Table 2 - Authors with more than 10 cites.

Authors	Scholarly Output	Most recent publication	Citations	Citations per Publication	Field-Weighted Citation Impact	h-index
Carvajal Veitía W	3	2021	12	4	0,21	3
González-Carbonell RA	3	2016	18	6	0,57	5
Cisneros Hidalgo YA	3	2016	18	6	0,57	4
Chico-Capote A	2	2015	32	16	0,61	4
Estévez del Toro MH	2	2015	32	16	0,61	4
Soto-Valero C	2	2020	12	6	0,73	7
Ríos-Garit J	2	2021	13	6,5	1,4	3
Enrique Guillen G	2	2015	32	16	0,61	32
Rodríguez-Álvarez Y	1	2015	21	21	0,12	5
Bringas Pérez R	1	2015	21	21	0,12	8
Miranda Navarro J	1	2015	21	21	0,12	1
Machado Diaz AC	1	2015	21	21	0,12	1
Santos Savio A	1	2015	11	11	1,1	2

Table 3 shows the topic clusters where the one with the highest scholarly output and prominence percentile was Stroke; Gait; Rehabilitation with 66 documents and the topic with the highest percent of publication share was Tibial Fractures; Bone and Bones; Tibia with 0,18 %; the field-weighted citation impact that had the number one position was Heart Rate; Blood Pressure; Patients. As for the institutions, the National Center for Scientific Research had the major number of publications; the Center for Genetic Engineering and Biotechnology was the number one in citations (n=32) and citation per publication (n=16); the University of Medical Science of Havana showed the highest number of authors (n=38).

DISCUSSION

Table 3 - Topic Cluster and Institutions.

Topic Cluster	Scholarly Output	Publication share (%)	Field-Weighted Citation Impact	Prominence percentile
Stroke; Gait; Rehabilitation	66	0,07	0,49	95,786
Spine; Patients; Low Back Pain	50	0,05	0,07	92,107
Bone And Bones; Osteoporosis; Bone Density	32	0,05	0,34	88,696
Exercise; Athletes; Muscles	29	0,04	0,24	91,839
Arthroplasty; Hip; Knee	29	0,05	0,05	84,95
Tibial Fractures; Bone and Bones; Tibia	27	0,18	0,5	39,064
Sports; Students; Athletes	24	0,07	0,32	84,415
Ankle; Foot; Diabetic Foot	22	0,07	0,13	69,03
Neoplasms; Sarcoma; Bone and Bones	22	0,06	0,01	70,033
Knee; Osteoarthritis; Cartilage	20	0,03	0,26	89,766
Heart Rate; Blood Pressure; Patients	19	0,13	0,56	57,191
Shoulder; Rotator Cuff; Tendons	19	0,04	0,01	77,124
Wrist; Hand; Tendons	15	0,1	0,13	35,585
Syndrome; Mutation; Hand	9	0,15	0	15,385
Compartment Syndromes; Rhabdomyolysis; Tourniquets	7	0,13	0,22	14,114
Sports; Athletes; Football	6	0,03	0,12	61,204
Bone And Bones; Bone Morphogenetic Protein 2; Heterotopic Ossification	4	0,05	0,12	34,849
Altitude; Anoxia; Altitude Sickness	4	0,07	0,02	28,161
Carpal Tunnel Syndrome; Median Nerve; Muscles	3	0,02	0,04	34,047
Spinal Cord Injuries; Wheelchairs; Rehabilitation	3	0,02	0	52,508
Infectious Arthritis; Osteomyelitis; Infection	2	0,05	0,11	8,896
Exercise; Hot Temperature; Athletes	1	0,01	0,28	56,187
Institutions				
	Scholarly Output	**Citations**	**Authors**	**Citation per publication**
National Center for Scientific Research	35	6	7	0,2
University of Medical Science of Havana	15	0	38	0
Clinic Surgery Hospital "Hermanos Armeijeiras"	7	2	20	0,3
University "Marta Abreu" of Las Villas	5	25	5	5
University of Camaguey	3	18	6	6
University of Holguin	3	1	6	0,3
University of Havana	2	1	2	0,3
Center for Genetic Engineering and Biotechnology	2	32	13	16
University Pedicatric Hospital "Paquito González Cueto"	2	0	2	0
National School of Public Health	1	6	5	6
Hematology and Inmunology Institute	1	0	7	0
Tehcnology University of Havana "José Antonio Echeverría"	1	1	4	1
University of Informatical Science	1	0	1	0
University of Matanzas "Camilo Cienfuegos"	1	0	4	0
University of Medical Science of Villa Clara	1	0	3	0
University of Cienfuegos "Carlos Rafael Rodríguez"	1	2	1	2

The years 2020 and 2021 in Cuba were greatly affected by the appearance of the COVID-19 epidemic, in March 2020, the first cases were declared and after 1 year and 3 months, the epidemic transmission phase was declared in 2021. This plot was counterproductive for the training system in the health sciences; for this reason, the Ministry of Public Health (MINSAP) and the University of Medical Sciences of Havana (UCMH) proposed strategies that would allow them to comply with the teaching programs and maintain active surveillance of this new virus.[10,11]

In spite of the research growth and the boom in scientific exchange that the arrival of COVID-19 meant, the authors consider that for surgical specialties such as Orthopedics and Traumatology this became a setback, the lack of medical supplies, the temporary closures of surgery rooms and the distancing of attention to the population due to their fear of contagion, brought

about a decrease in the acquisition of skills by recently graduated specialists and residents in training. The need for some non-primary courses -such as research methodology and biostatistics- to be taught in a non-classroom setting at that time may be a factor -mainly in the case of residents- that prevented them from getting closer to scientific communication.

Another problem that arose during this period was the need to establish the full-time confrontation of the epidemic as the main objective of public health personnel.

The metric studies of information are of vital importance in the sciences, regardless of the branch of science, since they contribute to the exchange between the actors involved in the processes of information use, from the variant of its production to its propagation, whether they are libraries, archives, companies, technology and science institutions or users.[12,13]

The metaverse is considered by some authors[14] an emerging area of research, which was created to develop a virtual world where the real context and immersive technologies are combined and thus the user through an avatar interacts and develops activities such as research, video games or sports training. Therefore, the authors consider that the immersion of Cuban researchers in this universe will contribute positively to increase the quality, visibility and impact of their publications, thus placing them in the high rankings of scientific communicators in the area of Orthopedics and Traumatology worldwide and, collaterally, the Cuban nation would gain positions in these rankings.

A journal acquires scientific visibility and increases its level in correspondence with the quality of the manuscripts it publishes and the rigor and knowledge of its editorial board; likewise, an article acquires quality depending on the journal where it is published. In relation to this factor, journals are organized and catalogued by quartiles in the 2 major world databases -Scopus and Web of Science-, due to the high visibility, impact and quality of these databases, authors are mainly referred to seek information in the journals indexed in them and, in turn, as a final objective of the development of research, they pursue the ability to publish articles in these journals. However, compared to other specialties such as Internal Medicine and General Surgery, Cuban Orthopedics and Traumatology does not enjoy a high scientific production, not only in Scopus or Web of Science but also in Cuban professional and student journals.[5,6]

For the location by quartiles of the journals, 4 fundamental classifications are used:[15,16]

.Q1: any journal that obtains percentiles higher than 75%.

.Q2: those of percentiles between 50 and 75%

.Q3: those with percentiles between 25 and 50%

.Q4: those with a lower percentile equal to or less than 25%.

Metric studies have contributed to the improvement of medical attention on osteomyoarticular diseases such as osteoarthritis -the most common form of arthritis-[17] since from the analysis of publications on these topics, specialists arrive at conclusions that allow them to comply with the principles of medicine of saving lives and improving the quality of these whenever possible.

Scientometrics proposes reliable indexes of this production that allow both the study of journals separately and as a whole, this comes to the background of the need to maintain a continuous monitoring of the results of serialized journals due to their rapid growth level in terms of their number.

The scientific production on Orthopedics and Traumatology has shown an increasing trend as can be observed in this research, where the years of greatest scientific production are 2021 and 2022, although by the number of citations it could be deduced that the quality of these studies in Cuba has decreased, or they are not of the interest of the scientific community as a whole.

The province of Havana has the strength of having in its research arsenal the largest specialized centers in the country in Or-

thopedics and Traumatology -Orthopedic Teaching Hospital ¨Fructuoso Rodriguez¨ and International Center for Orthopedic Research ¨Frank País¨- , so it is speculated that its scientific production in this specialty should be higher than reported, Piñera-Castro and Ruiz-González[18] exhibit that the creation of UCMH in student scientific journals concerns 121 articles in the five-year period 2017-2022 where in the year 2021, 50 manuscripts were published, which coincides with the increase established at the arrival of COVID-19 being this the main subject of most of the contributions made by the signatories.

In Latin America open science results in small steps and recent beginnings in terms of its development and promotion, the most outstanding experiences are essentially focused on the development of open access, its infrastructure and regulations.[19]

The fact that RCOT has the largest number of publications is not surprising given that although it is the national journal and researchers generally prefer local journals, it enjoys being indexed in a prestigious database and both its director and the president of the Sociedad Cubana de Ortopedia y Traumatología (SCOT) in compliance with the regulations established by MINSAP,[20,21] called for the support of researchers in this area of medicine to send their manuscripts to the journal, which is a strength for the RCOT and the SCOT in a reciprocal way, since the journal will receive a constant flow from the members of the society and in turn these members receive support in the world of scientific communication.

It is plausible to allude that the materialization of a product is never forgotten, this happens when research is finally published and stored in a database that will last for the rest of its existence. When research generates health and when it is published, the performance in this matter is learned and facilitates the process of knowledge education, therefore it is recalled that transmitting knowledge through scientific publications is a phenomenon that brings health to science, and in turn improves the physician-patient development of those who dedicate their lives to the care work combined with research.[22,23]

The knowledge of instruments, techniques, maneuvers, clinical forms, diseases, approaches and even the history of Orthopedics and Traumatology is achieved thanks to the constant effort of its preservation in digital history museums - scientific journals - through historical reviews or meta-analysis articles, this production allows not only the preservation but also the revolution of the specialty.[24]

CONCLUSIONS

Cuban scientific production on Orthopedics and Traumatology in Scopus is low, showing a tendency to increase in the last 2 years, it is still necessary to work towards increasing their visibility and impact, with greater emphasis on the RCOT as it is the national journal.

CONFLICT OF INTERESTS

The authors declare that there are no conflicts of interest.

AUTHORS' CONTRIBUTIONS

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Formal analysis: Lázaro Ernesto Horta-Martínez

Research: Lázaro Ernesto Horta-Martínez, Melissa Sorá-Rodríguez, Alejandra Armada-Capote, Ana Gloria Arias-Espronceda.

Methodology: Lázaro Ernesto Horta-Martínez, Melissa Sorá-Rodríguez.

Project administration: Lázaro Ernesto Horta-Martínez

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Writing – proofreading and editing: Lázaro Ernesto Horta-Martínez, Melissa Sorá-Rodríguez, Alejandra Armada-Capote, Ana Gloria Arias-Espronceda.

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