





ORIGINAL

Evaluation of the scientific production of the Instituto de Investigaciones en Microbiología y Parasitología Médica (UBA-CONICET)

Evaluación de la producción científica del Instituto de Investigaciones en Microbiología y Parasitología Médica (UBA-CONICET)

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ABSTRACT

Introduction: SciVal is a bibliometric tool used to assess the scientific output of institutions, such as the Institute of Research on Medical Microbiology and Parasitology (IMPaM), doubly dependent on Buenos Aires University (UBA) and the National Council of Scientific and Technical Research (CONICET). IMPaM studies medical microbiology and parasitology and has many research projects. Assessing it through SciVal will make it possible to identify areas of strengths and weaknesses to improve the scientific output at that institution.

Goal: assess the scientific output of IMPaM with SciVal, describing the methodology, results, conclusions, and recommendations to improve research at that institution.

Methods: the scientific production was analyzed, examining the research areas, the influence of that institution in the field of study, financing, and available resources. A database of researchers was used to carry out the analysis, and the scientific output was compared with similar institutions.

Results: the study found that more than one-half of the articles of that Institution are open access, and fostering their publication in open access journals without any embargo period is suggested. Besides, it was stressed that the most representative thematic areas are related to the social object of that Institution and that international collaboration is essential to scientific research. Finally, a decrease in citations by publication was noticed, keeping the impact of weighted citations by field, which suggests that the articles keep their relevance in their area.

Conclusions: IMPaM researches and publishes in Medicine, Immunology and Microbiology, Biochemistry, Genetics and Molecular Biology. Even though the number of open-access articles is large, it is below average in the Impact of Weighted Citations by Field, and it is necessary to strengthen the international collaboration links and widen thematic diversity to keep their relevance in scientific research.

Keywords: Scival; Bibliometrics; Bibliometric Indicators; Scientific Publication Indicators; Argentina; Medical Microbiology; Medical Parasitology.

RESUMEN

Introducción: SciVal es una herramienta bibliométrica utilizada para evaluar la producción científica de instituciones, como el Instituto de Investigaciones en Microbiología y Parasitología Médica (IMPaM) de doble dependencia de la Universidad de Buenos Aires (UBA) y el Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET). El IMPaM se dedica al estudio de microbiología y parasitología médica y cuenta con una amplia variedad de proyectos de investigación. Su evaluación a través de SciVal permitirá identificar áreas de fortaleza y debilidad para mejorar la producción científica en la Institución.

Objetivo: evaluar la producción científica del IMPaM con SciVal, describiendo la metodología, resultados, conclusiones y recomendaciones para mejorar la investigación en la Institución.

Métodos: se analizó la producción científica examinando las áreas de investigación, la influencia de la Institución en el campo de la investigación, la financiación y recursos disponibles. Se utilizó una base de datos de investigadores para llevar a cabo el análisis y se comparó la producción científica con otras instituciones similares.

Resultados: el estudio encontró que más de la mitad de los artículos de la Institución son de acceso abierto y se sugiere fomentar la publicación en revistas de acceso abierto sin periodo de embargo. Además, se destacó que las áreas temáticas más representativas guardan relación con el objeto social de la Institución y que la colaboración internacional es esencial para la investigación científica. Por último, se observó una disminución en citas por publicación, manteniendo el impacto de citas ponderadas por campo, lo que sugiere que los artículos mantienen relevancia en su área.

Conclusiones: el IMPaM investiga y publica en las áreas de Medicina, Inmunología y Microbiología, y Bioquímica, Genética y Biología Molecular. A pesar de que el número de artículos de acceso abierto es alto, está por debajo del promedio en el Impacto de Citas Ponderadas por Campo y necesita estrechar vínculos de colaboración internacional y ampliar la diversidad temática para conservar su relevancia en la investigación científica.

Palabras clave: SciVal; Bibliometría; Indicadores Bibliométricos; Indicadores de Producción Científica; Argentina; Microbiología Médica; Parasitología Médica.

INTRODUCTION

Science increasingly uses tools to measure the quality of the scientific output generated by institutions;⁽¹⁾ this assessment is critical to know their research's impact and influence on the scientific community and society. To achieve the objective evaluation, bibliometric analysis tools are required to assess the output, visibility, and impact of research, and, in this sense, SciVal is a bibliometric tool that has become one of the most used for such a purpose.

SciVal is a tool created by Elsevier, and it uses information from Scopus for bibliometric analysis. Said tool provides detailed, updated information about the scientific output of an institution and about the impact and visibility of its research on the scientific community and society in general; besides, it makes it possible to analyze the performance of the institution in different areas of study, identify the areas of strengths and weaknesses, compare the performance of the institution with that of other institutions and establish improvement plans to optimize the scientific output, etc. It has a series of metrics explicitly developed to assess scientific work in different research areas. These metrics are based on the analysis of the production and citation of research, and they allow a more precise and detailed assessment of the impact of research.⁽²⁾

Buenos Aires University (UBA) is Argentina's largest and most prestigious university, with a diverse educational offer and a significant scientific output. For its part, the National Council of Scientific and Technical Research (CONICET) was created to foster scientific and technical development in the country and coordinate the research activities of scientific and technological institutions. In this sense, both institutions have enabled the creation of doubly dependent institutes and, mainly drawing upon the Microbiology Department of the Faculty of Medical Sciences, with its professors and researchers, the result of the Institute of Research on Medical Microbiology and Parasitology (IMPaM) was proposed.⁽³⁾

IMPaM studies the areas of medical microbiology and parasitology, and it has a wide variety of research projects in areas such as molecular biology of pathogenic microorganisms, molecular epidemiology of infectious diseases, and antimicrobial resistance. This institution is strongly committed to training human resources in research. It offers graduate and postgraduate academic training programs in medical microbiology and parasitology, fostering the participation of students and scholarship holders about to take a master's or doctor's degree in its research projects.⁽⁴⁾

This paper presents an assessment of the scientific output of IMPaM by using the SciVal tool. For this purpose, the methodology used for bibliometric analysis is described, and the results obtained are presented, as well as some conclusions and recommendations to improve research at that Institution.

METHODS

A bibliometric study was conducted in which a database of researchers (laboratory directors/researcher in charge and members) was obtained from the institutional webpage, and the profile was created in SciVal.⁽⁵⁾

The scientific output analysis was performed by identifying the number of publications, the journals in which they are published, the quality of publications, and the collaboration with other institutions. Besides, the scientific output of that institution was compared with CONICET and UBA as institutions, using the profiles provided by the tool.

The thematic networks and co-citations in the specific field of study were analyzed to identify the research areas. Furthermore, the areas of research in which that institution has more scientific output and collaboration with other institutions were recognized.

The influence of that Institution was analyzed via the analysis of the h index, the number of citations, and the collaboration with other institutions. Also, that Institution's influence in the research field was compared with other institutions.

Finally, financing and the available resources for that Institution were analyzed. SciVal was used to obtain information on how IMPaM uses its resources to produce research and how financing affects its scientific output.

The information was processed and arranged with Microsoft Excel.

The periods chosen for the analysis vary from 2012 and 2021, and they are specified in the results presented. This is due to the dynamism proper to SciVal.

The information on the names of the researchers has been obtained from public online-accessed sources such as the institutional page of the institution involved.⁽⁵⁾ These data have been used to assess the collaboration among authors and institutions in this bibliometric study. It should be pointed out that the data used in this study are of public access, and no sensitive personal data have been used. The ethical and legal rules applicable to data management in research have been followed.

RESULTS

IMPaM

IMPaM was created in 2011 as an initiative of the professors and researchers working at the Microbiology, Parasitology, and Immunology Department of the Faculty of Medicine of Buenos Aires University, where it occupies the premises of said Department. It was created to study diverse aspects of microorganisms and parasites and the diseases they cause in humans. Its research focuses mainly on the conditions with a regional incidence in Argentina and bordering countries and on others with worldwide distribution and importance that can also affect the local population.

As for its specific goals, it proposes to study physiological, cellular, and molecular aspects of pathogens, research mechanisms of resistance and epidemiology, develop therapeutic and preventive strategies, develop diagnostic methodologies and train scientific and professional human resources. Besides, it aims to encourage the creation of reference laboratories and diagnostic services specializing in pertinent areas.

General vision of the scientific output in the period of 2012-2021

From 2012 to 2021, that Institution published 386 articles, 56,7 % of them being of open access and belonging to 65 researchers, with 5831 citations averaging 15,1 citations per publication. It should be remarked that the group of researchers comprises graduate researchers from CONICET, support staff, doctoral scholarship holders from UBA and CONICET, and collaborators. Its Field Weighted Citation Impact (FWCI) is 0,81.

The weighted citation impact is a bibliometric indicator that adjusts the number of citations received from a publication by the number of citations expected for similar publications in the same field to compare, in a fairer manner, the impact of research in different areas.

The addressed thematic areas (according to the classification of scientific journals used by Scopus, ASJC) with more presence are Medicine 62,7 %, Immunology and Microbiology 51,0 %, Biochemistry, Genetics and Molecular Biology 22,5 %, Agriculture and Biological Sciences 13,0 %, Pharmacology, Toxicology and Pharmaceutics 9,1 %.

The topics with more presence (table 1) relate to the general research topics of IMPaM. The topic with more impact of weighted citations per field is *Echinococcosis; Schistosomiasis; Parasites*; the one with more prominence is *Anti-Bacterial Agents; Infection; Methicillin-Resistant Staphylococcus Aureus*.

Subject	Ndoc	FWCI	Worldwide thematic prominence
Leishmania; Visceral Leishmaniasis; Trypanosoma cruzi	69	0,79	74,047
Anti-Bacterial Agents; Infection; Methicillin-Resistant Staphylococcus aureus	62	0,97	97,057
Echinococcosis; Schistosomiasis; Parasites	40	1,50	76,187
Candida; Infection; Candida albicans	24	0,78	85,552
Hepacivirus; Hepatitis B Virus; Hepatitis C	16	0,28	87,425

FWCI: Field-Weighted Citation Impact.

4,9 % of the pieces of research fall within 10 % of the most cited articles. 31,5 % of the articles are published in 10 % of the most cited journals.

Collaborations

Most of the articles were prepared by national authors, and the highest impact was measured in the international collaboration group.

Table 2. International collaboration during 2012-2021

Metrics		Ndoc	Ncit	Cpd	FWCI
International collaboration	35,8 %	138	2932	21,2	1,01
National collaboration only	55,2 %	213	2746	12,9	0,78
Institutional collaboration only	7,0 %	27	131	4,9	0,24
No collaboration	2,1 %	8	22	2,8	0,14

Academic-business collaboration is only 1,03 % (5 articles) with 22,4 citations per publication and FWCI 1,27 compared to non-academic-business collaboration with 98,7 %, 15,0 citations per article, and FWCI 0,80.

The institutions with more collaboration in the national sphere are:

- National Council of Scientific and Technical Research;
- Buenos Aires University;
- National Institute of Agricultural and Livestock Technology;
- Salta National University;
- National Administration of Dr. Carlos G. Malbrán Health Laboratories and Institutes.

On the other hand, the institutions with more collaboration in the international sphere are:

- University of the Republic, Uruguay;
- California State University Fullerton, USA;
- Havana University of Medical Sciences, Cuba.

Performance indicators

In the areas of microbiology and immunology (according to ASJC classification) with more weighted impact (FWCI), we found:

- Microbiology 0,75
- Parasitology 1,03
- Virology 0,53

From 2017 to 2022, 235 articles were published, where only 3,4 % ranked among the most cited, while 23,8 % were published in 10 % of the most cited journals.

Table 3. Articles published from 2017 to 2022 with their indicators inclusive

Year	Ndoc	Articles in the top 10 % most cited	Journal articles in the top 10 % most cited
2017	37	2,7 %	21,6 %
2018	35	5,7 %	33,3 %
2019	48	2,1 %	28,6 %
2020	46	4,3 %	34,8 %
2021	36	5,6 %	14,3 %
2022*	33	*	15,6 %

* Incomplete year.

The most cited articles in the previous years were:

- Ancarola et al.⁽⁶⁾ Cestode parasites release extracellular vesicles with microRNAs and immunodiagnostic protein cargo;
- Sotillo et al.⁽⁷⁾ The protein and microRNA cargo of extracellular vesicles from parasitic helminths - current status and research priorities;
- Challagundla et al.⁽⁸⁾ Phylogenomic Classification and the Evolution of Clonal complex five methicillin-resistant *Staphylococcus Aureus* in the Western Hemisphere;
- Suligoy et al.⁽⁹⁾ Mutation of *Agr* is associated with the adaptation of *Staphylococcus aureus* to the host

during chronic osteomyelitis;

- Villanueva et al.⁽¹⁰⁾ Brilliant release of antimicrobial ZnO nanoplates from a pH-responsive keratin hydrogel.

From a historical position of articles published in Q1 amounting to 63,5 %, it came to be 64,2 % in the last five years according to Scimago Journal Rank (SJR) classification.

Table 4 includes the ten journals in which the institution has published more articles, and it is a valuable tool for understanding its research profile and the areas of knowledge in which they stand out.

Journal	Ndoc	SJR
PLoS ONE	18	0,852
Revista Argentina de Microbiología	16	0,363
PLoS Neglected Tropical Diseases	15	1,45
Infection, Genetics and Evolution	13	0,974
Current Microbiology	10	0,478
Acta Tropica	10	0,757
Frontiers in Cellular and Infection Microbiology	9	1,389
Revista Cubana de Investigaciones Biomédicas	8	0,117
Frontiers in Immunology	8	2,331
International Journal for Parasitology	7	1,03

SJR: Scimago Journal Rank.

In the last three years (2020-2022), the recount of visits dropped from 1226 to 841 and 573, respectively. The recount of visits in SciVal is generated out of the data of use in Scopus. The metric is the sum of seen abstracts and clicks on the link to see the full text on the publishing house’s website.

Figure 1 illustrates the annual impact compared to the number of citations per publication. When comparing the effect per year with the number of citations per publication, an idea of the influence and relevance of the research carried out in a specific period can be obtained.

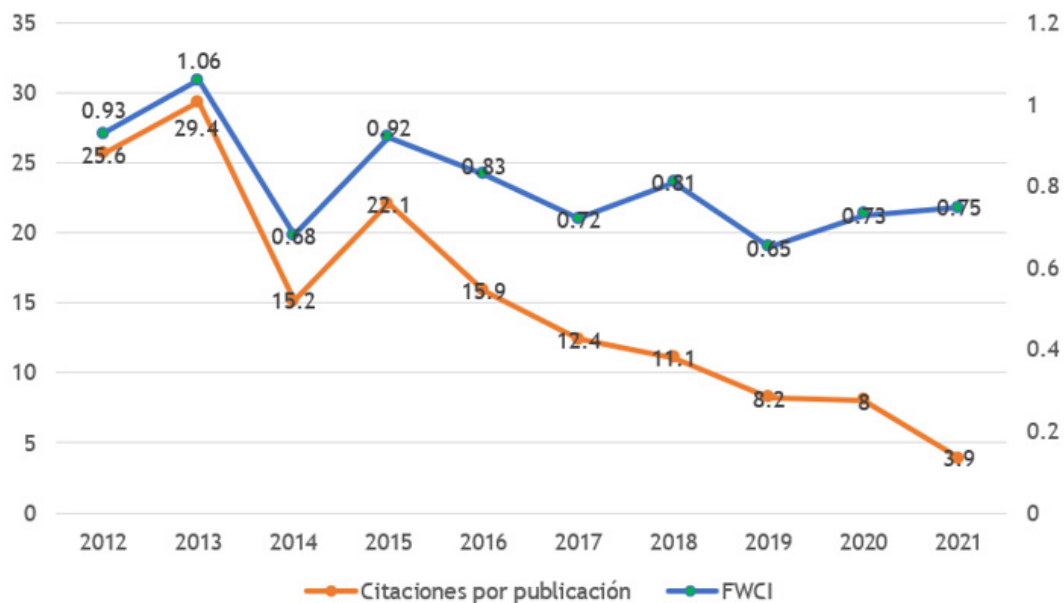


Figure 1. Field Weighted Citation Impact (FWCI) compared to Citations per publication in 2012-2021

Table 5 shows the institution’s twenty authors with the highest h index. H index is a bibliometric metric used to measure the productivity and impact of a researcher based on the number of citations received from their most cited publications. It makes it possible to compare researchers from different areas of knowledge.

Table 5. Authors with the highest h index

Author	Ndoc	Most recent paper	Ncit	Cpd	FWCI	H Index
Centrón, Daniela	47	2021	611	13	0,69	27
Sordelli, Daniel Oscar	22	2021	616	28	1,34	25
Rosenzvit, Mara Cecilia	34	2021	1097	32,3	1,6	23
Frank, Fernanda María	17	2020	316	18,6	0,81	21
Buzzola, Fernanda R.	22	2021	379	17,2	1,03	18
González-Cappa, Stella Maris	13	2021	184	14,2	0,73	18
Cucher, Marcela Alejandra	28	2021	1129	40,3	1,73	16
Alba-Soto, Catalina Dirney	17	2020	238	14	0,93	15
Cuestas, María Luján	38	2021	430	11,3	0,84	14
Lauthier, Juan José	25	2021	368	14,7	0,82	13
Ruybal, Paula	24	2021	255	10,6	0,69	13
Quiroga, Cecilia	19	2021	461	24,3	0,91	13
Mathet, Verónica Lidia	18	2021	190	10,6	0,48	13
Mirkin, Gerardo Ariel	12	2021	271	22,6	0,85	13
Cerquetti, M.	9	2021	107	11,9	0,39	13
Oubiña, José Raúl	19	2020	140	7,4	0,39	12
Noto Llana, Mariángeles	15	2021	346	23,1	0,98	12
Petray, Patricia Beatriz	10	2020	107	10,7	0,59	12
Sanjuán, Norberto A.	9	2020	102	11,3	0,41	12
Solana, María Elisa	8	2020	100	12,5	1,05	12

The most cited authors are Cucher MA with 1129 citations, Rozenzvit MC with 1097 citations, and Sordelli DO with 616 citations.

IMPAM in the context of UBA and CONICET

Table 6 shows the comparison between institutions regarding different indexes. The comparison of institutions based on citations per publication is essential in the academic and scientific sphere because it is considered an indicator of the quality and impact of the research produced by each institution.

Table 6. Comparison of institutions according to different indexes in several areas 2012-2022

Parasitology Area			
Institution	Cpd	% Publications cited	Ncit
CONICET	11,4	88,2 %	14 485
IMPAM	15,1	91,2 %	1027
UBA	11,0	89,7 %	4378
Microbiology Area			
CONICET	16,0	88,5 %	30 726
IMPAM	12,3	88,8 %	1321
UBA	13,4	87,0 %	10 004
Virology Area			
CONICET	15,6	87,8 %	8315
IMPAM	11,6	91,3 %	267
UBA	12,9	87,5 %	3098

The leading international institutions that have cooperated with CONICET in the area of parasitology are:

- University of the Republic. Montevideo, Uruguay;
- Fundação Oswaldo Cruz. Rio de Janeiro, Brazil;

- Universidade d São Paulo. São Paulo, Brazil;
- National Autonomous University of Mexico, Mexico City, Mexico;
- Friedrich-Loeffler-Institute. Greifswald, Germany;
- The University of Valencia. Valencia, Spain.

In the area of microbiology, the following stand out:

- Higher Council of Scientific Research. Madrid, Spain;
- Centre National de la Recherche Scientifique. Paris, France;
- Universidade de São Paulo. São Paulo, Brazil;
- California State University Fullerton. California, United States of America;
- Institut National de la Recherche Agronomique. Paris, France;
- Tohoku University. Sendai, Japan.

And in the area of virology, we found:

- Centre National de la Recherche Scientifique. Paris, France;
- Institut Pasteur Paris. Paris, France;
- University of Queensland. Queensland, Australia;
- National Institutes of Health. Bethesda, United States of America;
- United States Department of Agriculture. Washington DC, United States of America;
- Centers for Disease Control and Prevention. Atlanta, United States of America.

The following are institutions with potential collaboration for each of the fields above respectively:

- University of Oxford. Oxford, United Kingdom;
- Ministry of Agriculture of the People's Republic of China. Beijing, China;
- University of North Carolina at Chapel Hill. North Carolina, United States of America.

DISCUSSION

Though 56,7 % of the articles are of open access, one could wonder why 43,3 % are not. Concerning this issue, it should be remarked that Argentina is a pioneer in open access, and it should be encouraged that those pieces of research resulting from public financing be published in open-access-compatible journals without any embargo period. Among the policies like this one, we can mention Plan S launched for European institutions. ^(11,12)

The Field Weighted Citation Impact is 0,81; it should be stressed that IMPaM is below average by just 19 %.

In the scientific output, we found areas that are not the institute's object of study. It is essential to know that, before doing a degree or training course, some researchers used to work in other institutions, lines, and subject matters. The addressed thematic areas with more presence bear relation to the corporate purpose of the institution, the ones with more presence being Medicine; Immunology and Microbiology; and Biochemistry, Genetics and Molecular Biology.

Among the topics with more articles under the Global Thematic Prominence value, the most important one is *Anti-Bacterial Agents; Infection; Methicillin-Resistant Staphylococcus Aureus*. Global Thematic Prominence measures the relative importance of an institution in a field of research as compared to other institutions at the world level. However, the topic *Echinococcosis; Schistosomiasis; Parasites* has a field-weighted citation impact of 1,50, meaning that it is more cited than the average of articles on the said topic in 50 %.

International collaboration is essential to scientific research since it allows sharing of knowledge and resources to address complex issues. Cooperation can also increase the visibility of a scientific article, as it involves a larger group of researchers who can contribute different perspectives and skills. ^(13,14)

It should be pointed out that the group of articles with international collaboration was the one that got the most significant number of citations per publication, in addition to having the most significant impact; however, the ones having less impact were those written by a single author. Lack of collaboration between the institution and companies continues to be a problem because it would allow the transfer of knowledge and technologies that can lead to significant innovations and progress in research and development. ^(15,16)

Within doors, that institution has kept the same historical rates of scientific output for the last five years (2017-2022). It keeps published Q1 63,5 % of the articles corresponding to 2017 and 64,2 % of those from 2022.

From 2020 to 2022, the recount of visits from Scopus to the journals' websites housing the articles of that institution dropped. In Argentina, the population's preventive and compulsory social isolation was decreed early to stop the progression of the SARS-Cov-2 pandemic 17, and, together with this, the scientific activity in these thematic areas decreased; nevertheless, this did not directly influence other indicators of activity.

Regarding figure 1, despite the weighted impact fluctuating between the years, the citations per publication dropped. Said index weights the importance of articles per every area of study. This trend indicates that reports keep their reputation within their area, though they need to be cited.

Concerning the information provided in table 5, it can be mentioned that the author with the highest h index is Centrón D. It should be pointed out that the time we assessed extends from 2012 to 2022, so there may be

other researchers with more time in their career as researchers but their scientific output may fall into a period before 2012. Therefore, this table would be helpful to assess researchers whose years of careers are similar. H index is an important metric to determine the productivity and impact of a researcher as it makes it possible to measure the number of publications by an author and the number of times these publications have been cited, which provides a more precise measurement of the impact of the research done by an author.⁽¹⁸⁾

Regarding the most cited authors, the first two work at the same laboratory in that institution. This may be due to their working on similar research projects and collaborating in joint publications, which can increase the visibility of their work and the number of citations they receive. Besides, they may use similar techniques and methodologies in their research, which can make their findings compared and cited. It is also possible that the two authors have complementary skills and knowledge, allowing them to do high-quality research that is much cited. Finally, external factors may affect the number of citations received by the publications, such as the relevance of the piece of research to the scientific community or the number of journals where their work is published.

When the different areas of interest were assessed compared to other institutions, we can see that, only in parasitology, the rate of citations per publication is higher than in CONICET. This points to the high quality and contribution of said pieces of research to the progress of knowledge in their field. Besides, it should be remarked that the scientific output of IMPaM is part of the output of CONICET, but not conversely.

International collaboration is essential to research because it allows the exchange of knowledge and resources, which can improve the quality of research. Knowing the institutions one collaborates with is critical as it helps establish good relations and identify new opportunities for collaboration. Identifying potential institutions of cooperation is essential since it makes it possible to expand the network of partnerships and access new perspectives and skills in research. Regarding these assessed data, we should point out that SciVal only enables us to determine the institutions collaborating with CONICET rather than IMPaM; therefore, it restricts assessment to parasitology, microbiology, and virology.

CONCLUSIONS

That institution has 56,7 % of open-access articles, though its field-weighted citation impact is 19 % below average. The most represented thematic areas are Medicine, Immunology, Microbiology, Biochemistry, Genetics and Molecular Biology. Anti-Bacterial Agents; Infection; Methicillin-Resistant *Staphylococcus aureus* is the most important at the world level, while the field weighted citation impact of Echinococcosis; Schistosomiasis; Parasites is 1,50. International collaboration is essential, but there needs to be more collaboration between the institution and companies. That institution keeps its scientific output; though the citations per publication drop, the weighted impact remains, thus indicating their importance in their area. The author with the highest h index is Centrón D, and the two most cited authors collaborate on similar research projects.

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FINANCING

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CONFLICT OF INTEREST

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