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Research article

THE EVOLUTION OF SCIENTIFIC PUBLISHING DURING THE LAST DECADE

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Introduction: The scientific evolution of the past decades has led to an important increase in the amount of scientific information published in specialized journals and indexed in online research platforms. Developing online information sources has facilitated researchers' access to knowledge from both fields as both a reader and an author. *Methods*: This article is an analysis of the number of journals and of the number of indexed documents in research platforms during 2005–2015. *Results*: The results show an important increase in the number of journals over this period, as well as an increase of more than 50% in the number of documents indexed annually for each of the analyzed databases. *Conclusions*: The estimation of medical journals can and should be the subject of future and continuous research.

Keywords: Scientometry, scientific research, journals.

INTRODUCTION

The scientific evolution of recent years has inevitably led to an increase in the ways of communicating the results of scientific research as well as its dissemination to scientific communities around the world. At the same time, the emergence of online science platforms and journals has made access to literature available and easier for both authors and readers.

The area where technological change has had perhaps the most important impact is medicine, knowing a strong evolution in the last two decades. In particular, surgery has benefited, alongside other medical fields, of major improvements in the diagnosis and the operatory and perioperative therapeutic management.

In this context, it is legitimate to ask how the scientific literature in general and the specialized medical literature have evolved in the last period.

METHODS

The present article represents a retrospective analysis of the quantity of scientific information, with the scientific literature as a whole, the scientific literature in medicine as well as the surgical literature being treated in a comparative manner. Regarding the field of surgical sciences, we considered cumulatively all surgical specialties. The period over which research was concentrated ranges from January 1, 2005 to December 31, 2015.

We have analyzed the data available to users from the most representative platforms: Web of Science, Scopus, Springer and DOAJ.

The graphs show the evolution of various parameters, expressed as a percentage, considering the value of 2005 of the respective parameter as a reference. Quantification of documents has taken into account all published / indexed documents (articles, books, editorials, etc.).

RESULTS

WEB OF SCIENCE

The Web of Science (WoS) research platform, made available by 2016 by Thompson Reuters, subsequently taken over by Clarivate Analitycs, is by far the most popular database since 1955. It calculates the Impact Factor for the most important magazines and publishes them annually in the Journal Citation Report (JCR). Nowadays, among science journals in the field of accurate science, the JCR includes only those indexed in the Science Index Citation Expanded (SCIE).

The evolution in the number of magazines indexed in SCIE and included in the JCR between 2005 and 2015 showed a continuous increase with a slight acceleration in 2008–2011. The number of magazines indexed in the JCR in 2005 was 6088. In 2015 there were 44% more journals indexed over the 2005 figure, with 8,802 magazines to be identified in this year. Medical journals, and particularly those in the field of surgical sciences, showed a similar increase reaching 477 medical journals out of a total 2990 medical articles (Figure 1) in 2015.

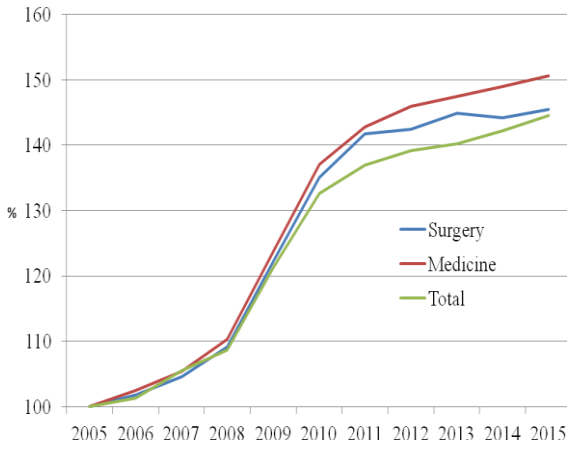

Figure 1. Evolution in the number of SCIE indexed magazines included in JCR (According to WoS [1]).

Compared to the evolution of the number of JCR journals, the number of documents indexed in SCIE during the analyzed period showed an approximately linear increase, increasing by 47% in 2015 (1823666 documents) compared to the 2005 value index (1239900 documents). Documents indexed in SCIE having as a subject medicine in general or surgical sciences in particular showed a similar increase. Of note is that we have identified an approximately equal percentage of medical records out of the total published documents each year. Specifically, the share of medical records was around 39% (Figure 2).

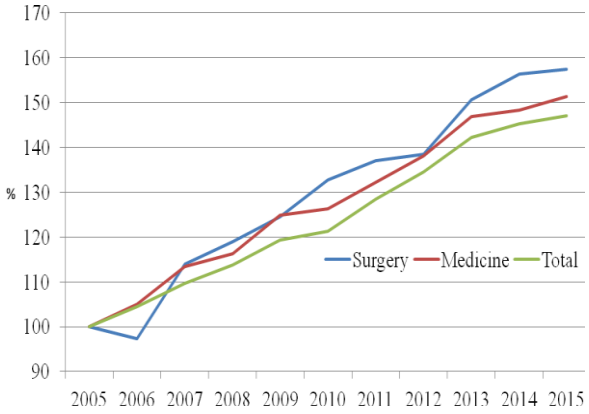

Figure 2. Evolution of the number of SCIE indexed documents (According to WoS [1]).

SCOPUS

The Elsevier Scopus platform is the largest bibliometric database set up in 1995. It has gained ground through both the large amount of information made available to users and by the proposed metrics used to analyze it.

The number of magazines indexed in Scopus in 2005 was 12725 for an almost double number of magazines to be indexed in 2015, namely 22639. A similar increase is also highlighted in the case of medical journals that have grown by 63 % compared to 2005 (Figure 3).

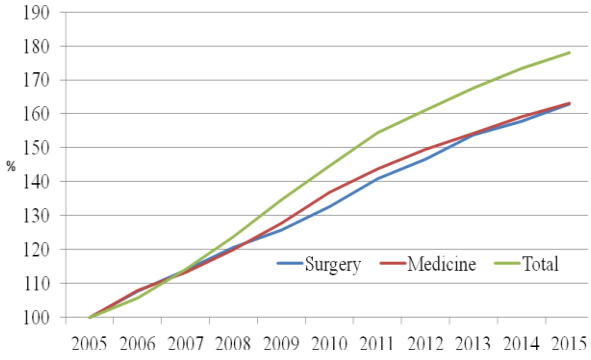

Figure 3. The evolution of the number of magazines indexed in Scopus (According to Scopus [2]).

The number of documents indexed in Scopus showed a uniform increase in the period between 2005–2014, reaching almost 3000000 documents. In what concerns medicine, the growth is more pronounced, with the share of medical articles in the

total number of papers rising from 23.9% to 33.4% (Figure 4).

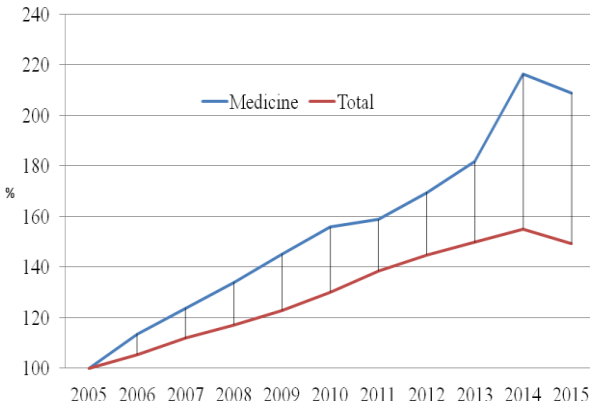

Figure 4. The evolution of the number of documents indexed in Scopus (Scopus According to [2]).

SPRINGERLINK

SpringerLink is the online platform of the reputed Springer-Nature publishers and provides users with a number of magazines and documents that place it performance-wise along with Scopus and WoS.

In terms of the number of indexed magazines, we see an increase of 50% over the period 2005–2015, taken into account in this research. In 2005, there were 1,916 journals, while in 2015 the number of magazines has reached 2852. With regards to the medical field, the increase in the number of magazines is similar to the total number of indexed magazines (Figure 5).

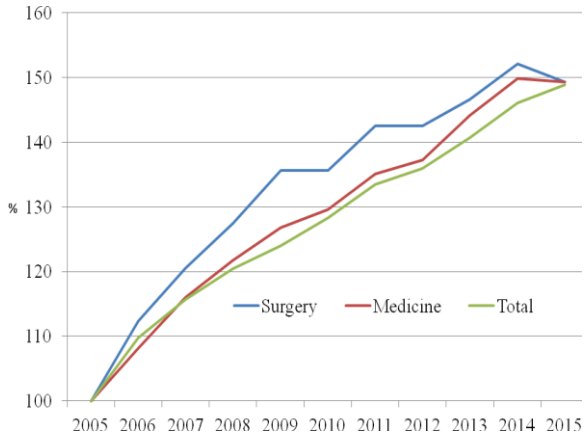

Figure 5. The evolution of the journals indexed in Springer (Springer According to [3]).

In terms of the number of documents indexed by SpringerLink, we see an important increase, showing a value of 1101079 documents in 2015 compared to 2005 when only 559807 documents were indexed. At the same time, graphic representation shows a similar increase in medical and surgical domains (Figure 6).

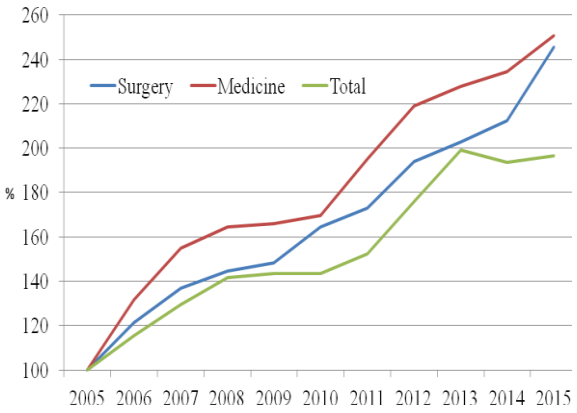

Figure 6. The evolution of the number of documents in Springer (Springer According to [3]).

OPEN ACCESS

The notion of Open Access has developed as a result of the digital revolution in the past two decades. The digitization of magazines was the basis for the emergence of this concept that facilitated access to specialized literature.

The definition of Open Access has been drafted in the Budapest Convention (2002) [4] and has been applied to the Bethesda (2003) [5] and Berlin (2003) [6] conventions and can be summarized as follows: the journal allows readers to read, download, copy, distribute, print, search, or link to the full texts of its articles and to use them for any other lawful purpose.

Many countries have already created policies on open access publishing. Of these, perhaps the most important thing is the European Union Horizon 2020 [7], which, among other things, requires that everything that is published at the European level by 2020 is Open Access.

As a result of the increase of open access concept – in 2008–2013 47.1% of everything published globally was OA [8] – a database appeared indexing exclusively Open Access peer reviewed journals, namely Directory of Open Access Journals (DOAJ).

In terms of the number of journals, we see a rapid increase in the investigated period, reaching in 2015 a total of 7133 indexed journals, of which 927 are medical. The very high value of the percentage

in 2015 in relation to the reference index in 2005 is due to the fact that the DOAJ was at the beginning and was founded in 2001. In the first year investigated, only one journal of surgery and 51 general medicine journals from a total of 239 were indexed.

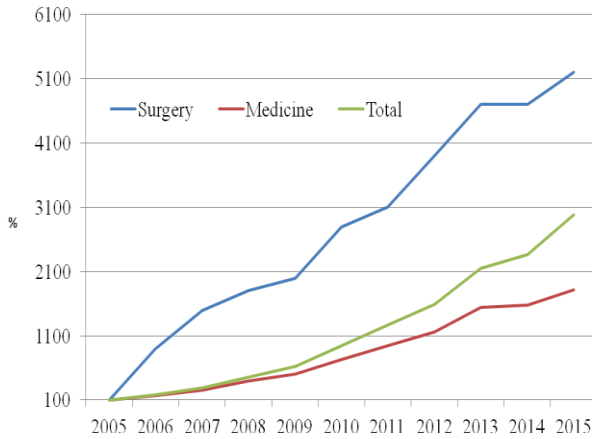

Figure 7. The evolution of the journals indexed in DOAJ (DOAJ According to [9]).

From the point of view of the number of documents indexed annually by DOAJ we observe an almost exponential growth in the period 2005–2012 for all three categories investigated. The decrease in the growth rate of the number of indexed articles in the period 2013–2015 is due to the change in the indexing criteria in order to tighten them.

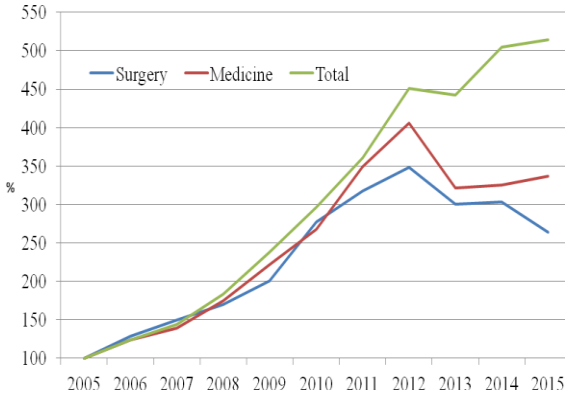

Figure 8. The evolution of the number of documents indexed in DOAJ (DOAJ According to [9]).

DISCUSSIONS

The assessment of scientific research should not be done solely quantitatively, using citric-based metrics, but it is also necessary to evaluate magazines qualitatively with the help of experts to remove content that does not meet scientific standards [10–12]. It is true that the number of citations is a marker of impact on the scientific community and can be perceived as an element of qualitative analysis. However, many studies have shown that this number can be artificially increased [13]. The technical possibilities have allowed the emergence of pirate magazines that have led to the flooding of online media with poor quality items. If in the present study we have shown that millions of articles are published annually and if we consider the existence of at least the same number of magazines that do not have a rigorous evaluation process, we conclude that there are at least an equal number of published articles in these magazines. Without denying that these articles are written to the highest quality standards, we must draw attention to irrational and redundant publication. An unreasonable motivation for these articles may be the desire of researchers to get the best results of scientometric evaluations in order to get promotions or funding. A solution for avoiding this situation could be the evaluation of the research in terms of the qualities of the articles rather than the quantity, with a new concept being defined – influential authors, having a small number of articles with many quotations [14].

We chose two bibliometric databases (WoS and Scopus), a publisher (Springer) and an aggregator (DOAJ) to show the evolution of the number of magazines / documents not only from independent authors but also owned by the same publisher (Springer).

We preferred a relative and not an absolute data presentation to show the evolution (growth) as progression and not as an absolute increase (which varies greatly from one platform to another) – this number being not relevant to our study.

CONCLUSIONS

The ever-growing number of magazines due to the technological revolution that today supports exclusive online magazines at minimal costs has inevitably led to an increase in the amount of published information. The multiplication of sources of information poses problems in relation to the correctness of this huge amount of information published annually.

The present study only presents databases with a very serious peer review process, but we cannot fail

to mention the fact that besides these top magazines there is a much larger number of magazines whose content probably exceeds highly the data presented in this article. The estimation of these journals can and should be the subject of future research.

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