

Publish Together or Perish. Increase in Number of Authors per Article in the Revista Argentina de Cardiología between 1934 and 2009

RAÚL A. BORRACCI^{MTSAC, 1, 2}, JULIO BALDI (H), HERNÁN C. DOVAL^{MTSAC, 2}, CARLOS D. TAJER^{MTSAC, 2}

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Address for reprints:

Dr. Raúl A. Borracci
La Pampa 3030 - 1° B
(1428) Buenos Aires, Argentina
e-mail: raborracci@gmail.com

SUMMARY

Background

Since several international journals have demonstrated increase in the mean number of authors per article, “publish or perish”, the guiding principle of academic life, has transformed into a new principle, “publish together or perish”.

Objective

To analyze the increasing trend in the number of articles, authors and number of authors per article published in the *Rev Argent Cardiol* from its creation to the present.

Material and Methods

We retrospectively reviewed the database of the articles published in the *Rev Argent Cardiol* from 1934 to 2009. The information about the number of articles, authors and authors per article was retrieved separated by each year; trends over time and variation rates were analyzed.

Results

The number of articles published between 1934 and 2009 had a variation rate of 1.23, corresponding to an average annual growth rate of 1%. The number of authors varied was 6.75 times and the average annual growth rate was 2.7%. The number of authors per article increased 2.48 times, equivalent to an average annual growth rate of 1.6%. From 1958 to 2009, the average number of women per article increased 18 times, corresponding to an average annual growth rate of 5.8%.

Conclusions

We observed a significant increase in the absolute number of articles, authors and authors per article between 1934 and 2009. The average number of women per article increased during the last 50 years, from 1% to 5.8% per year. This trend towards the increasing average number of authors per article may be due to scientific collaboration, greater number of multicenter or multidisciplinary papers, or less strict criteria for authorship.

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Key words > Bibliometrics - Cardiology - Argentina

BACKGROUND

The guiding principle of academic life, “publish or perish”, refers to the need of publishing new work frequently in order to obtain fundings for investigation or simply for scientific prestige. Since several international journals have demonstrated increase in the mean number of authors per article, this concept has transformed into a new principle, “publish together or perish,” suggesting greater scientific cooperation among the investigators. (1, 2) This trend towards an increase in the number of authors per publication may be justified by the development of more multicenter trials and the current complexity of investigation, requiring greater interdisciplinary

work. However, this increase might also be due to a less strict management of the criteria or conditions to be incorporated as author or coauthor of an article. (3-5)

Recently, a local article evaluated the structure of different scientific collaboration networks among Argentine cardiologists. The conclusion of this investigation was that the structure of connections and collaboration between investigators was inadequate. (6)

The increasing number of publications and investigators seems to be a constant around the world; for this reason, we decided to analyze the increasing trend in the number of articles, authors and number

^{MTSAC} Full Member of Sociedad Argentina de Cardiología

¹ Biostatistics, School of Medicine, Universidad Austral, Argentina

² Sociedad Argentina de Cardiología, Argentina

of authors per article published in the *Rev Argent Cardiol* from its creation to the present.

MATERIAL AND METHODS

We retrospectively reviewed the database of the articles published in the *Rev Argent Cardiol* from 1934 to 2009. We used a digitized file published in a DVD during the 70th anniversary of the *Revista Argentina de Cardiología* and performed a manual search for the articles published since 2005. The information about the number of articles, authors and authors per article was retrieved separated by each year. Only original articles, cases reports and review articles were included in this analysis. We also identified the gender of each author to evaluate the trends per gender. Absolute and average values were used to analyze the trends along the time of the different data, and the evolution was compared with that of other international journals. Finally, we estimated the variation ratios between the extremes for each of the trends and the mean variation rates. The absolute values of the different years were compared using the two-tailed z -test of the total standard error; the average of authors per article was analyzed using the Student's t test for normal distribution of data.

RESULTS

Figure 1 shows the increase in the absolute number of articles and authors published in the *Rev Argent Cardiol* between 1934 and 2009 (number of articles in 1934 and 2009, respectively: 22 vs. 49, $p = 0.0007$; number of authors in the same years: 40 vs. 310, $p < 0.0001$). The increase in the number of articles had a variation rate of 1.23, corresponding to an average annual growth rate of 1%. The number of authors varied 6.75 times between 1934 and 2009 and the average annual growth rate was 2.7%. Figure 2 shows the increase in the number of authors per article published in the same period (average of authors per article in 1934 and 2009, respectively: 1.82 vs. 6.33, $p < 0.0001$). The variation rate of the number of authors per article increased 2.48 times, equivalent to an average annual growth rate of 1.6%. Finally, Figure 3 describes the increase in the number of female authors per article published in the *Rev Argent Cardiol* between 1958 and 2009, as there were no women among the authors of articles published before that date (average of female authors per article in 1958 and 2009, respectively: 0.06 vs. 1.14, $p < 0.0001$). From 1958 to 2009, the average number of women per article increased 18 times, corresponding to an average annual growth rate of 5.8%

COMMENTS

The universities use to base their models of development evaluating the achievements of their professors, research groups and institutional indices associated with productivity. The publication of investigational articles is one of the requisites to obtain recognition and promotion. (7) In fact, the scientific associations and the society in general offer more job opportunities to those who declare more articles published in their resumes. This might justify the increase in the number of authors and publications. We observed a significant increase in the number of articles, authors and authors per article similar to the trend observed worldwide. The greatest increase was seen in the

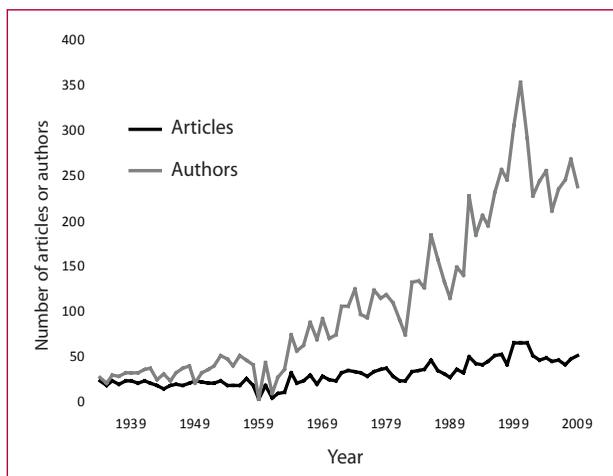


Fig. 1. Trend in the number of articles and authors published in the *Rev Argent Cardiol* from 1934 to 2009.

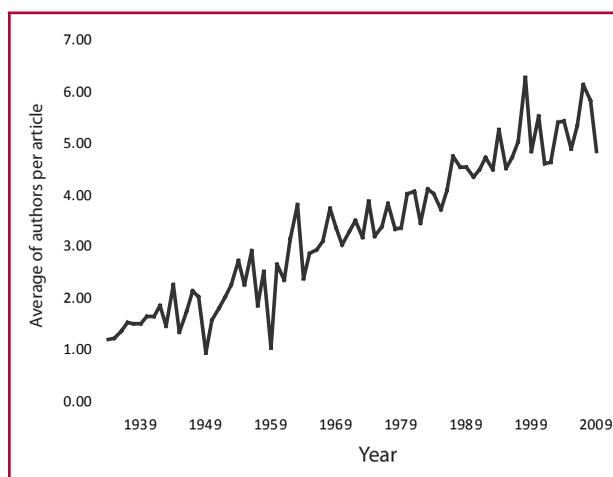


Fig. 2. Trend in the number of authors per article published in the *Rev Argent Cardiol* from 1934 to 2009.

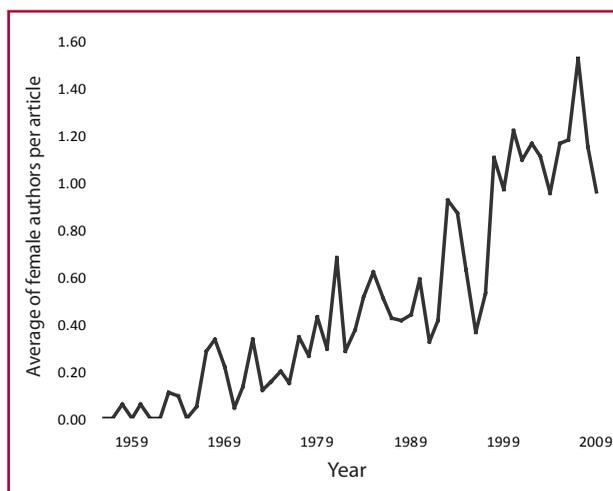


Fig. 3. Trend in the number of female authors published in the *Rev Argent Cardiol* from 1958 to 2009. There were no female authors before this period.

number of female authors, followed by the number of authors in general and in the number of articles. However, this study evaluated only one journal; thus, the number of articles was limited by the number of issues published per year and by the extension of each number, which is not greater than 50 articles per year. In 2005, the average number of authors per article published in the *Rev Argent Cardiol* was 5.8 compared to 7.0 in the *J Trauma*, 6.7 in the *N Engl J Med* and 5.2 in the *Ann Intern Med*. (2)

Visibility refers to the probability of being cited by other authors or articles. This implies that publishing is not enough to transmit scientific knowledge; the article should be read and cited and, if possible, should collaborate in the construction of new study hypotheses. Anyway, some authors have demonstrated the association between the number of articles published and visibility, the likelihood of being cited by others. Reynolds and Wierzbicki (8) found a logarithmic relation between the frequency of publication and visibility, with an increasing probability of citation as publication frequency increases until reaching a plateau.

The academic pressure of "publish or pressure" has been pointed out as a possible cause of bias and transgression in the publications. Fanelli (9) reported that the articles generated in research centers with greater academic pressures or demands produced more positive or favorable results (papers more likely to support a tested hypothesis) than those groups less competitive. These findings might reflect that competitive academic environments have better investigators and investigations, thus, the results use to be more predictable. However, the greater pressure to obtain "positive" results might generate the use of false or fabricated data to satisfy the expectations of projects' directors or managers. A meta-analysis evaluated the results of surveys which had asked scientists directly whether they had committed or knew of a colleague who committed research misconduct. The answers identified that 14% had observed fabrication and falsification of data by other colleagues and 2% of scientists admitted to have fabricated, falsified or modified data or results. (10) Undoubtedly, this information should attract the attention about the importance of the increasing number of publications over the time.

There are other gray areas that concern ethics in writing: double publishing, self plagiarism, and submitting the "minimal publishable unit." The first concept refers to publishing the same set of data in two different journals, contradicting the famous Ingelfinger rule. Self plagiarism indicates using the same text in several articles with slight modifications to produce other articles, while the last version of the "minimal publishable unit" generates newly obtained data from the same investigation. (11)

The International Committee of Medical Journal Editors, ICMJE published the criteria to justify authorship. (12) Authorship credit should be based on 1) substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data; 2) drafting the article or revising it critically for important intellectual content; and 3) final approval of the version to be published. *Authors* should meet conditions 1, 2, and 3. On the contrary,

acquisition of funding, collection of data, or general supervision of the research group, alone, does not justify authorship. Different journals have reported that between 4% and 50% of authors cannot justify their inclusion in the articles published according to the ICMJE criteria. (3-5)

CONCLUSIONS

This review article of the *Rev Argent Cardiol* observed a significant increase in the absolute number of articles, authors and authors per article between 1934 and 2009. In addition, the average number of women per article increased during the last 50 years, from 1% to 5.8% per year. The greatest increase was observed in the number of female authors, followed by the number authors in general and in the number of articles. This trend towards the increasing average number of authors per article may be due to scientific collaboration, greater number of multicenter or multidisciplinary papers, or less strict criteria for authorship.

RESUMEN

Publicar juntos o perecer. Incremento del número de autores por artículo en la Revista Argentina de Cardiología entre 1934 y 2009

Introducción

A partir de que varias revistas internacionales demostraron un incremento del número promedio de autores por artículo, el concepto de "publicar o perecer", referido en el ámbito académico a la necesidad de publicar artículos permanentemente, derivó en el concepto de "publicar juntos o perecer".

Objetivo

Analizar la tendencia de crecimiento de la cantidad de artículos, autores y autores por artículo en la *Rev Argent Cardiol* desde su creación hasta la actualidad.

Material y métodos

Se revisó en forma retrospectiva la base de datos de los artículos publicados en *Rev Argent Cardiol* desde 1934 hasta 2009. Se recabó información sobre el número de artículos, autores y la cantidad de autores por artículo para cada año por separado y se estudiaron la tendencia en el tiempo y las tasas de variación.

Resultados

El incremento de la cantidad de artículos entre 1934 y 2009 tuvo una tasa de variación de 1,23 veces, lo que corresponde a una tasa media de crecimiento del 1% anual. En el número de autores, la tasa de variación fue de 6,75 veces, con una tasa media de crecimiento del 2,7% anual. La tasa de variación de la cantidad de autores por artículo mostró un incremento de 2,48 veces, lo que equivale a una tasa media de crecimiento del 1,6% anual, mientras que el número promedio de mujeres por artículo mostró una tasa de crecimiento entre 1958 y 2009 de 18 veces, lo que corresponde a una tasa media de crecimiento anual del 5,8%.

Conclusiones

Se observó un incremento significativo del número absoluto de artículos, autores y autores por artículo entre 1934 y 2009. Se comprobó además un aumento del número promedio de mujeres por artículo en los últimos 50 años; la magnitud de estos crecimientos fue del 1% al 5,8% anual. Esta tendencia a

umentar el promedio de autores por artículo podría deberse a una mayor colaboración científica, a un incremento del número de trabajos multicéntricos o multidisciplinarios o a un manejo menos estricto de los criterios para ser incorporado como autor en un trabajo.

Palabras clave > Bibliometría - Cardiología - Argentina

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