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A Survey of the Number of Authors of Articles Based on Different Journal Indexes, the Type of Articles, and the Authors' Gender in Iranian Medical Journals in 2015-2020

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Abstract

One of the main features of the research system is scientific participation, which is growing rapidly. Scientific participation is often considered as an effective solution for countries to acquire scientific and technological knowledge. Therefore, the purpose of this study was to determine the average number of authors of articles based on the journal indexes, type of articles, and the authors' gender in Iranian Medical Journals with different indexes in the period 2015-2020. In this cross-sectional study, 60 articles in randomly-selected Iranian Journal of Medical Sciences were selected by simple sampling. After categorizing the journals according to their indexes, we selected 10 journal titles from each index and 20 titles of the first published article of each journal were selected according to the type of article. Then, the data were entered into Excel and analyzed by using SPSS software version 21. The total number of authors of articles according to their index was 4.24. Also, the findings showed that there was a significant difference in the mean of the number of authors in Iranian medical journals. (P-value =0.000). It is suggested that the authors of journal articles should be more inclined to write articles in groups in order to increase scientific cooperation between Iranian authors of medical science journals. This can play an important role in raising the quality of articles.

Keywords: *Scientific Participation; Authors of Articles; Index; Iranian Medical Science Journals; Article Type*

Introduction

The study of scientific collaborations among scientists was first examined by Price in his famous book, The Great Science, the Small Science. Since then, numerous researches have been done on collaboration and co-authorship, and researchers have developed and applied various methods and indicators for this field of research. In Iran, however, few studies have been conducted in this field, and most of them have examined international cooperation between Iranian writers and other countries (1). Scientific progress of any country can be evaluated based on the scientific activities of its researchers. Therefore, recognizing and evaluating scientific activities is very important for research planning and

policy making (2). Books, research reports, dissertations, conference papers and scientific journals are among the major sources of information for researchers (3). Scientific journals are one of the channels of scientific communication between experts in the field of research and a tool for rapid and widespread dissemination of new achievements in the world of research (4). Today, medical science journals have proven their vital role in the health of human societies. The importance of these journals is such that the existence of specialized journals in the field of medicine, in order to present health research, is essential for any society (5). Writing an article and publishing it in journals is a challenge for researchers. One of the main features of the research system is scientific cooperation, which is growing rapidly; it is often considered as an effective solution in acquiring scientific knowledge and technology for countries, so that cooperation in writing articles is one of the indicators for examining the validity of scientific articles (6). Participation in research creates a network of scientific communication between researchers, which in addition to transferring knowledge and information in a minimum of time, increases the citation of the article; thus, increasing the likelihood of citing the work and the effectiveness of its results are visible in the works of others (7). The scientific cooperation movement has a special place in the process of scientific development of the country. Scientific development and the achievement of great research achievements requires the participation and cooperation of all researchers and scientists; therefore, participation and cooperation is one of the instruments of scientific development (8). Riahi believes that scientific and research cooperation between developing and developed countries can lead to the growth and expansion of their scientific potential and connection to scientific and research networks worldwide (9). The benefits of scientific collaboration include access to multiple ideas and resources, exchange of scientific information, especially between different disciplines, learning new skills, greater efficiency, high-quality results, improvement of the quality of the article, and use of the expertise and skills of the co-author. Scientific development in some ways depends on the connection between scientific ideas. The process of cooperation in the field of science production has taken on new dimensions, including the spread of mass media, especially the Internet; also, many Iranian scientific papers with the cooperation of authors from various foreign universities and institutions have been written internally (10). Scientific and research articles and reports are often the result of the work of numerous authors, and as Posner points out, the academic work is increasingly the result of group work (11). One of the most important factors in scientific development is conducting scientific research in a participatory manner worldwide. Scientific cooperation by increasing the complexity of knowledge and by increasing the demand for further specialization and interdisciplinary skills have been developed in the research and this gives the researchers the opportunity to show the capabilities of different scientific research disciplines combined, which is not possible individually. In the meantime, co-authorship as one of the objective examples of scientific cooperation has been considered by many researchers and in practice can be used through analysis of co-authorship in published scientific outputs as well as using network analysis (12). Scientific participation is a process in which two or more authors share their resources, experiences, and talents with the goal of creating a collaborative work (1). Faraj Pahlo showed that the level of group participation among Iranian writers in the subject area is very low (13). In another study, Heidari and Safavi examined the impact of collaboration among the authors of the articles (Iranian Journal of Pathology) between 2006 and 2012. The results showed that the level of cooperation among pathology researchers is high (6). Malek Ahmadi, by examining the level of group cooperation of medical researchers during the years 2007-2010, found that the average coefficient of cooperation between researchers in research projects in the mentioned years was 0.25 (14). The results of another study conducted by Danesh et al. in relation to the study of scientific participation of researchers of Isfahan University of Medical Sciences in conducting research projects conducted in this university between 2006 and 2001 showed that 617 researchers participated in 138 research projects studied, The average number of researchers was 4.47 and the average coefficient of cooperation among them was 0.26 (15). Nikzad et al. examined the pattern of the co-authorship network of ISI articles in the social sciences, including management, economics, psychology, librarianship, and information science, from 2000 to 2009. The results of their research showed that the average number of authors in the field of social sciences was 2 or 3 authors in these articles (16). In the study conducted under the title of reviewing the collaboration of the authors of articles

published in the Journal of Clinical Psychology, Semnan University, in the period 2009 to 2012, the average number of authors of articles was reported to be 3.35. Also, the average number of authors in this study by gender was 71.2% for males and 28.8% for females (17). In another study conducted by Batooli, examining the citation rate and group participation of articles in the scientific research journal of Kashan University of Medical Sciences (Feyz) from 1381 to 1387, the results showed that the average number of male and female writers was 27.8 and 71.2, respectively (18). Farshad et al. found that most of the corresponding authors of articles published from 1391 to 1396 were men (19). The results of Zare Farashbandi et al. study showed that women were less involved than men in collaborating and writing articles with each other. Also, the collaboration among the authors has been more with the participation of two authors (20). Given the importance of medical science journals, as one of the effective channels in scientific development and cooperation, and considering the review of journal articles in different indexes, the present study aimed to find the average number of article authors based on different journal indexes as well as in types. We examined various articles and gender of authors in Iranian medical science journals in the period 2015-2020. Therefore, the main aim of this study was to investigate the average number of authors of journals in different indexes and according to the type of article and also the average number of authors of articles according to gender.

Method

This is a cross-sectional study conducted in 1400. The main collection of this study included 60 Iranian journals of medical sciences through a random selection from 460 journals available in the database of medical journals in Iran at the Internet address (https://journals.research.ac.ir/). In the present study, the journals were categorized into 6 indexes: ISI, Scopus, PubMed, Google scholar, SID, EBSCO indexes by selecting 5 journals with an IF under 1 and 5 journals between 1-2 in total for the ISI index; they were divided according to the other indexes, so that 10 journal titles were selected separately for each index: in each index 10 journal titles for PubMed, 10 for Scopus, 10 for SID , 10 for EBSCO, 10 for ISI, and 10 journals for Google scholar. After selecting the journals, for each journal based on the year of publication of the article separately from 2015 to 2020 and, the articles were extracted for each journal; 120 titles of articles and a total of 7200 scientific research articles were reviewed in the present study. The reviewed articles included Original research articles, Review articles, Letters to the editor, Brief report articles, and Case report articles. Since the main focus of the study was on the published articles mentioned, other articles were left out. To select the articles separately, we referred to the journal site and printed the articles published in the journals according to each journal index. Then, the information of the articles including the title of the article, the number of authors of the articles in the first articles published in the years 2015 to 2020 and the type of article. Also, the information collected from the journals included the name of the journal and the index of the journal. Therefore, the collected data were entered into Excel and analyzed using SPSS software version 21. After determining the normality of data distribution, to evaluate one-to-one comparison of journal indexes with Bonferroni Post Hoc tests, we used frequency tables, mean , and One Way ANOVA test. A significance level of less than 0.05 was considered with a 95% confidence interval.

Results

After analyzing the data by a statistician, the results of the average number of authors in different indexes were reported. According to the results, as shown in Table 1, the journals were categorized according to the articles extracted in each journal index. We collected 1200 articles in EBSCO, 1200 in Google Scholar, 600 in ISI (IF between1-2) and 600 articles in ISI (IF under 1), 1200 in PubMed, 1200 in Scopus, and 1200 articles in the SID. The status of the average number of authors in journals can be seen in the indexes listed in Table 1, respectively. As shown, the highest average number of authors according to the index was related to journals indexed in ISI and the lowest average number of authors belonged to

those in Google Scholar index. This indicates that the authors of articles published in ISI index journals are more inclined to collaborate with other authors in writing articles and are more involved in this field. Therefore, in this regard, the average number of authors in this index is higher than other journal indexes. Also, the total average number of authors according to their indexes was 4.24. The status of the average number of authors in relation to the type of article in Iranian medical journals is displayed in Table 2. As shown, the largest number of articles published in journals are original research articles (6433 articles). Also, the lowest number of articles (46 articles) belonged to Brief report articles. According to the information shown in Table 2, the highest average number of journal authors in relation to the type of article and the number of articles belonged to Brief report articles and the lowest average in terms of the number of articles to the article was Letter to the editor articles. According to Table 2, the average of all authors compared to the type of article was 3.94 out of 7200 titles of the reviewed articles. Also, the average number of authors in relation to the type of index and the type of article according to gender was examined. The average number of authors of articles in relation to the type of journal index was adjusted according to the gender of the authors in Table 3. As shown, the highest average number of male authors belonged to PubMed journals and the lowest average number of authors relative to journal indexes for index journals were reported in Google Scholar. Also, the highest average number of female authors was found in Scopus-indexed journals, and the lowest average number of female authors were seen the journals indexed in Google scholar. The results showed that out of 7200 article titles, the average share of male authors in relation to the type of journal index was 2.49, and that for female authors was 1.74. This indicates that the scientific collaboration is greater in male authors. The status of the average number of authors in relation to the type of article by gender is displayed in Table 4. As shown, the highest average number of male authors in relation to the type of article according to the number of articles is allocated to Brief report articles with an average of 3.07. Also, the articles in the Letter to the editor show the lowest average of 1.67, according to the number of articles published. For female writers, the highest average was found in Case report articles and the lowest in the Letter to the editor articles. Regarding the average total number of authors by gender, the average total number of male and female authors was 2.41 and 1.53, respectively. This indicates that the average number of authors and academic contributions are high among male authors (Table 6). In the present study, in order to correlate the mean number of article authors in the examined indexes, we compared the mean differences of the indexes one by one using the Bonferroni test (Table 5). As Table 5 shows, the reviewed journals in the indexes that have a large average difference with each other were marked with a * sign, which indicates the existence of a large average difference between the two groups of journal indexes. Journals index in EBSCO had the most average differences with PubMed and Scopus journals. Also, there was the slightest difference between the average of the journals indexed in EBSCO and SID. For journals indexed in Google Scholar, the biggest difference was in PubMed and Scopus journals. The least differences were seen in EBSCO journals. As Table 5 shows, PubMed journals are significantly different from Scopus journals. For Scopus journals, according to the data in Table 5, it was shown that they have the highest average difference with PubMed journals. As to SID-indexed journals, the results showed that there was a significant difference between SID- and PubMed-indexed journals. Also, As to the difference between the average of the journals indexed in ISI with IF between 1 and 2 and those with IF under1 in the present study, the study showed that there was a significant difference between the average number of authors in these two groups of journals.

Table 1. The average number of authors of articles in the journals indexed in different agencies

Journal Index	Mean	N
Scopus	4.15	1200
PubMed	4.96	1200
Google scholar	3.62	1200

SID	3.86	1200
EBSCO	3.77	1200
ISI	5.06	1200
Total	4.24	7200

Table 2. The average number of journal authors by article type

Type of Article	N	Mean	Std. Deviation
Original article	6433	4.29	1.975
Review article	354	3.83	2.059
Case report	233	4.29	1.880
Brief report	46	4.52	1.929
Letter to editor	134	2.78	1.944
Total	7200	3.94	

Table 3. The average number of authors in relation to the index of journals reviewed by gender

Gender		Number of articles	Journal index
Female	Male		
1.95	2.22	1200	Scopus
1.79	3.17	1200	PubMed
1.65	2.21	1200	SID
1.56	2.06	1200	Google scholar
1.92	3.14	1200	ISI
1.60	2.17	1200	EBSCO
1.74	2.49	1200	Total

Table 4. The average number of authors by the type of articles reviewed in journals by gender

Gender		Number of articles	Article Type
Female	Male		
1.77	2.52	6433	Original article
1.61	2.22	354	Review article
1.46	3.07	46	Brief report
1.72	2.57	233	Case report
1.10	1.67	134	Letter to the editor
1.53	2.41	7200	Total

Table 5. The mean difference among the average number of article authors in the reviewed indexes

Journal index	Mean difference				
	Scopus	Google scholar	PubMed	SID	EBSCO
Scopus	.	.530*	-.807*	.293*	.385*
Google scholar	-.530*	.	-1.337*	-.238*	-.145
PubMed	.807*	1.337*	.	1.099*	1.192*
SID	-.293*	.238*	-1.099*	.	.093
EBSCO	-.385*	.145	-1.192*	-.093	.
***mean difference is high**					

Table 6. The mean difference among journals with an IF between of 1 to 2 compared to those with an IF under 1

Journal index	Mean difference	
	ISI IF between 1-2	ISI IF under 1
ISI IF between 1-2	.	.733*
ISI IF under 1	-.733*	.
*means difference is high		

Discussion

The results of the present study showed that there was a significant difference among the average number of authors of journal articles in the mentioned indexes. The low average number of authors in the present study indicated the cooperation of fewer authors in the articles published in Iranian medical journals. Journals that have an average number of authors have more value in terms of getting more citations than other journals. In the present study, scientific cooperation and participation in research and its benefits were mentioned in detail. Given that previous research has shown a tendency for multiple authors to collaborate to write a highly cited article, the results of the present study showed that the average number of article authors in journals with different indexes was small although the mean difference was close in some respects, and this point is worth considering. Based on the study and as shown in Tables 1 and 2, the highest number of articles in the present study was observed in Original research articles and the lowest in Brief report articles. As to the average number of authors in terms of gender and also according to the type of article and index of journals studied in the present study, it was indicated that the average number of male authors was higher than female ones. The results of this section are consistent with those of Rahmani et al., where the average number of male writers was 56% and that of female writers was 44%; also, the number of male writers was higher than females (21). Farshad et al. found that most of the corresponding authors of articles published from 1391 to 1396 were men. The results of this section are consistent with those of the present research which showed that male writers had a greater share in writing participation articles (19). Marefat et al., in a study of articles published in the Journal of Clinical Psychology, found that the average number of male authors in the 128 articles reviewed was 71.2% and that of female authors was 28.8%. The results of this study are consistent with those of the present study in terms of having a higher average number of male authors in the reviewed

articles (17). The results of Zare Farashbandi et al. showed that out of 1005 authors who were involved in the production of articles in the journals under review, 198 were female and 807 were male. Thus, the share of women in the production of information in the journal was a quarter of male (20). Also, Batooli found in her research that the average number of male writers was 27.8 and that of female writers was 71.2. The results of this section are not in the same line with those ofthe present study (18). According to Bashiri's findings, the result of the research showed that out of a total of 354 articles, 94% were in the Persian and 6% in English language. 82.6% of the authors were male and 17.4% female. Among the contributing countries in the publication of articles, 96% of the authors were from Iran and 4% from other countries, with Germany, Russia, France, and Finland with the largest number of authors (22). In this regard, measures should be taken to encourage the authors to write articles in a team. As a result, they should cooperate more in writing the article. The results also showed that the total number of authors in different indexes in the present study was 4.24. The results of this section are almost consistent with those of Danesh et al.; they reported an average of 4.67 authors (15). Mohammadi et al., in a study on the level of group cooperation with the number of citations to articles published in English-language journals of the Ministry of Health indexed in Web of Science from 2005 to 2011, reviewed 21 journals and found that in writing each article an average of 4.37 authors contributed. The average cooperation rate was 67%. The results showed that there was a positive and significant correlation between the number of authors and the number of citations to each article (23). Regarding the comparison between ISI journals with an IF between 1 and 2 and those with IF below 1, the present study showed that there was a significant difference in the means between these two groups. This is because the importance of writing an article in ISI- indexed journals is more and writing an article and publishing it in these journals has a high research prestige. Therefore, it makes writers more sensitive to write an article and publish it in these journals because it makes them publish more cited and stronger articles in their field. In the present study, the average number of authors in these journals was moderate and desirable. However, the number and average number of article authors and their participation in such journals are expected to increase. Examining the coefficient of cooperation in the departments of Kurdistan University in 2008, Fatemi et al. found that the highest coefficient of cooperation was related to articles published in ISI journals and the lowest to those published in journals with other indexes. The results of this study are consistent with those of the present study due to the high participation of authors in journals indexed in ISI (24). The study of Fooladian, Mohammad Ismail et al. showed that the coefficient of group collaboration between authors was a desirable number, and the authors were able to cooperate well and closely with other researchers in their scientific output. In other words, 72% of the scientific outputs have been written with the scientific cooperation of researchers (25).

The present study had two limitations. First, according to the total number of medical science journals extracted from the database of Iranian medical journals, the total number of journals in this system was very large (460). Therefore, the scope of this study was limited to different indexes of the journals and specific articles in the field of medical sciences. Second, the results of the number of journals and articles reviewed in the present study might limit the generalizability of the findings. Therefore, according to the time set for reviewing this study and the inaccuracy and inequality of the number of articles in the years studied in Iranian medical journals in this study, random selection was used. Examining the level of such cooperation at the national level will be effective. On the other hand, the average number of authors of articles and also the status of cooperation of authors of articles reviewed in this study with those in international and foreign journals in Iran should be examined and the results of this study should be compared. One of the implications of the present study is that the results of such studies can be used to evaluate Iranian medical journals in different indexes and their authors. Researchers can also benefit from the results of this research in their study. It is hoped that the present study can be effective in improving the performance of Iranian medical journals and promoting the quality of articles and cooperation in writing articles for its journals. Recommending the importance of joint cooperation in writing and publishing scientific articles, the reasons for the ups and downs in the level of cooperation, the number of authors, the number of men and women authors in writing the article and the factors affecting it are suggested. Finally, researchers interested in conducting similar studies are

advised to focus more on the scientific collaboration of the authors and to conduct such studies for various medical science journals. On the other hand, conducting such studies can be a report of the level of scientific collaboration of authors and have a good positive effect in increasing the collaboration of article authors.

Conclusion

The important point in the present study is that the authors of journal articles should be encouraged to write articles in groups to increase scientific participation among the authors of Iranian medical journals; also, this cooperation can play an important role in improving the quality of articles.

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Conflict of interest

There is no conflict of interest.

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