Original Article

**Bibliometric Analysis** of Parasitological Research in Iran and Turkey: A Comparative Study

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**ABSTRACT**

**Background:** This study was designed to assess and compare the quantity and quality of Iranian and Turkish researchers working in the field of Parasitology from bibliometric point of view.

**Methods:** To assess the contributions and achievements of the Iranian and Turkish parasitologists, bibliometric analysis was carried out based on the citation data retrieved from Web of Science.

**Results:** The absolute productivity of Turkish and Iranian parasitologists’ papers has almost tripled for Turkey, from 12 papers in 2002 to 36 papers in 2011, and decuple for Iran, from 10 papers to 123 from 2002 to 2010. The average number of citation per article is about 5.8 and 4 for Turkish and Iranian parasitologists’ papers, respectively. The “Veterinary Parasitology” journal was the most cited journal in both countries. The majority (more than 90%) of cited items was foreign journal articles and one half of all references in journals articles dated 11 and 12 years while one half of cited books was dated within 14 to16 years for Turkish and Iranian papers, respectively.

**Conclusion:** Based on observed data and applied model, it is anticipated that the total number of Iranian and Turkish parasitologists’ publications in Web of Science will exceed of 2512 and 240 articles per annum for Iranian and Turkish in 2020, respectively.

**Keywords:** Bibliometric indicators, Citation analysis, Iran, Turkey

**Introduction**

Scientific progress is one of the most important indicators for the social and economic development (1). In developing countries, where improvements in healthcare and medicine are most needed, knowledge
creation, and especially, applications of findings are key factors in their development (2, 3). During 2000s both the number of universities and research institutions and academic members has grown considerably in Iran and Turkey. Based on diverse reports, Iran and Turkey, during the past decade had a noticeable contribution in science. For instance, Iran and Turkey had remarkable input on parasitological research, as each country has succeeded to include, at least, one parasitology journal to be indexed in Web of Science (Iranian journal of parasitology and Türkiye parazitoloji dergisi= Acta parasitologica Turcica) (4-6).

From a single Iranian paper indexed in Science Citation Index (SCI) in 1972 (7), in conjunction with the fast growing scientific publications elsewhere in the world, studies of and Osareh and Wilson(8) have shown Iran to have been making considerable movements towards collaboration in the world of scientific productivity. The same is true for Turkey as the first paper related to the field of parasitology was published in 1977. Struggling to improve both countries’ position in the world of science, researchers have been encouraged to publish their findings in highly ranked international scientific journals (9). The main sources for such measurements have been the bibliographical databases compiled by the Institute for Scientific Information (ISI) (3). Citation analysis traces, between scholarly works can assist in the identification of the origin and impact of ideas and thereby the assessment of contribution in the making of scientific knowledge (10).

This research focuses on the bibliometric indicators to identify mainly: a) the format of materials used in Iranian and Turkish parasitological research, b) the age of cited items, c) the most frequently used journal titles which are critical to maintaining a core collection; and d) the half life of the most cited journals.

**Methods**

The Web of science database was queried based on the term "Iran and Turkey" in the “address” field and refined by “Parasitology” as a subject category on 31 December of 2011. There were 323 and 678 publications that met the selection criteria for Turkey and Iran, respectively.

The bibliographic data were transferred to Microsoft Excel™. Further confirmation of the author’s affiliation was obtained by checking the address for the authors. The dataset was examined from different perspectives, including year of publication, type of publication, the most productive authors, institutions or universities, the authorship pattern, core subject areas and journals. In addition citation data of the articles published in journals indexed in Web of Science were analyzed separately, from different points of view. The citation half-life for each of the most cited journals’ titles were then calculated by working out the time taken to receive 50% of the total number of citations from the current publication year backwards.

**Results**

Until 31th December 2011, 323 and 678 articles were indexed in web of science by Iranian and Turkish researches on Parasitology and its related subject areas.

Table 1 shows the growth rate of parasitological publications from Iran and Turkey in the WoS. The absolute productivity of Turkish and Iranian parasitologists’ papers has almost tripled for Turkey from 12 papers in 2002 to 36 papers in 2011 and ten times for Iran from 10 papers to 97 at the same time. Interestingly a more sophisticated analysis revealed that the percentage of growth is in favor of Turkey. The following table and figure have been developed to shed light this aspect.

**Authorship**

The last few decades have witnessed a growth in collaborative endeavours as a study (11) demonstrated that, in general, the impacts of UK papers in any discipline or sector are higher if there is a collaboration of some kind. To see authorship pattern within publications
indexed in WoS by Iranian and Turkish researchers working on parasitological matters. Table 2 and Fig. 1 serve to illustrate the model.

With respect to the authors’ collaboration, the above table shows that, overall, about 96% in Turkey and about 94% in Iran about 94% of papers were written in multiple-author status.

Table 1: Trend of articles published by Iranian and Turkish parasitologists in journals indexed in Web of Science from 1972 to 2011

| Publication Year | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1983 | 1984 |
|------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| No of article (Iran) | 1    | 6    | 4    | 2    | 1    | 3    | 4    | 3    | 5    | 4    | 1    | 1    |
| No of article (Turkey) | 0    | 0    | 0    | 0    | 0    | 0    | 1    | 0    | 0    | 0    | 1    | 1    |
| Publication Year | 1987 | 1988 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
| No of article (Iran) | 0    | 0    | 0    | 0    | 1    | 2    | 2    | 6    | 2    | 1    | 10   | 6    |
| No of article (Turkey) | 1    | 1    | 1    | 1    | 0    | 2    | 1    | 1    | 2    | 1    | 3    | 4    |
| Publication Year | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
| No of article (Iran) | 7    | 7    | 10   | 13   | 22   | 18   | 47   | 63   | 95   | 108  | 123  | 97   |
| No of article (Turkey) | 4    | 8    | 12   | 18   | 19   | 25   | 29   | 42   | 41   | 36   | 30   | 36   |

Table 2: The collaboration pattern of Iranian and Turkish scientists’ publication indexed in Web of Science

| No of authors’ collaboration | % of papers In Turkey | % of papers In Iran |
|-----------------------------|-----------------------|---------------------|
| Single author               | 3.7                   | 6.0                 |
| 2 Authors                   | 13.9                  | 9.6                 |
| 3 Authors                   | 19.2                  | 20.4                |
| 4 Authors                   | 16.7                  | 18.9                |
| 5 Authors                   | 13.0                  | 14.5                |
| 6 Authors                   | 14.6                  | 11.9                |
| 7 Authors                   | 5.3                   | 6.8                 |
| 8 Authors                   | 5.3                   | 4.7                 |
| 9 Authors                   | 2.2                   | 3.4                 |
| 10 Authors                  | 2.5                   | 1.9                 |
| 11 Authors                  | 0.9                   | 1.3                 |
| 12 Authors                  | 0.9                   | 0.3                 |
| 13 Authors                  | 0.6                   | 0.3                 |
| 14 Authors                  | 0.6                   | 0.3                 |
| >15 Authors                 | 2.8                   | 0.3                 |
| Total no of papers          | 323                   | 678                 |

Fig. 1: The percentage of authors’ contribution in relation to the percentage of articles production
Fig. 1 shows that 2% of Iranian and 4% of Turkish of authors were responsible for the 25% of articles production. Fifty percent of articles had been published by 7% and 14% and 75% of articles were produced by 26% and 38% of authors in Iran and Turkey respectively. The figures implicitly indicate that the responsibility and accountability are more shared among Turkish parasitologists compared to Iranian parasitologists. The collected data allowed for author productivity to be measured on the basis of the number of articles published. The most prolific authors In Iran were Mohebali, M. with 47 and Vatandoost, H. with 34 papers and in Turkey the most productive authors were Aktas, M. with 18 and Dumanli, N. with 13 papers, respectively.

Most cited articles in WoS
The objective of the following analysis is to identify and list the articles that have influenced others the most as measured by citation count. An understanding of which research is viewed by the research community as most valuable to build upon may provide valuable insights into what research or even researcher to focus on now and in the future (12). Citation data being available for articles indexed in WoS shows that 323 and 678 published articles by Turkish and Iranian parasitologists received 1884 and 2726 citations. In other words, the average number of citation per article is 5.8 and 4 for Turkish and Iranian papers, respectively. Among them 40% of Iranian and 27% of Turkish articles had not received any citations by the time of the analysis. Based on the analysis, a list of the 3 most cited articles is presented in Table 3.

Table 3: The 3 most cited articles of Turkish and Iranian parasitologists in WoS

| Authors          | Iranian papers                                      | Turkish papers                                      |
|------------------|-----------------------------------------------------|----------------------------------------------------|
| Ok, et al.       | Leishmaniasis in Turkey                             | Mohebali et al.                                    |
|                  | Time cited: 49                                      | Title: Epidemiological aspects of canine visceral   |
|                  | Year of publication: 2002                          | leishmaniasis in the Islamic Republic of Iran       |
| Altintas         | Past to present: echinococcosis in Turkey           | Dalimi, A and et al.                               |
|                  | Time cited: 48                                      | Title: Echinococcosis/hydatidosis in western Iran  |
|                  | Year of publication: 2003                          |                                                   |
| Hurst, et al.    | Adoniavariegata (Coleoptera : Coccinellidae) bears  | Hashemifesharki, R                                |
|                  | maternally inherited Flavobacteria that kill males  | Control of theileria-annulata in Iran              |
|                  | only                                               |                                                   |
|                  | Time cited: 47                                      | Time cited: 55                                     |
|                  | Year of publication: 1999                          | Year of publication: 2005                          |

Journal Titles
The three top ranking journal titles in which Iranian and Turkish parasitologists published their papers for Turkish papers are “VET PARASITOL”, “PARASITOL RES” and “J CLIN MICROBIOL” with 202,180 and 100 indexed papers respectively. With regard to the Iranian papers, the distributions of articles’ journal titles are “VET PARASITOL”, “AM J TROP MED HYG” and “PARASITOL RES” each with 688, 483 and 360 published papers.

Affiliations
The addresses of all authors were assessed to determine most productive Iranian- and Turkish based universities or institutions. The results of top-ranked Iranian and Turkish re-
searcher’s affiliations publications in journals covered by WoS for Turkey are “Firat Univ”, “Ondokuz Mayis Univ” and “Ege Univ” each with 28,17 and 16 papers and the Iranian top universities were “Univ Tehran Med Sci”, “Inst Pasteur” and “Univ of Tehran” each with 134, 65 and 59 published papers, respectively.

**Topics**
The distribution of subject categories of Iranian and Turkish parasitologists’ articles indexed in WoS shows that in both countries around 64% of articles were directly related to the parasitology. Further analysis of counts of Iranian and Turkish parasitology papers’ cross pollination in different specialties reveals that the cross pollination difference within two subject categories is significant. While for the veterinary subject area Iranian parasitologists had not paid attention, Turkish parasitologists wrote about 12% of their papers on that category. The vice versa is nearly true for public environmental and occupational health.

**Type of Articles**
An analysis of the types of published papers in WoS was also carried out. The results are summarized in Table 4. Accordingly more than 92% of the papers were original research articles. Of these, around 4% are proceedings paper, the rest being either letters or editorial materials or reviews.

| Type of articles          | Frequency for Turkey | Percentage | Frequency for Iran | Percentage |
|---------------------------|----------------------|------------|--------------------|------------|
| Article                   | 301                  | 93.2       | 627                | 92.1       |
| Proceedings paper         | 12                   | 3.7        | 30                 | 4.4        |
| Review                    | 11                   | 3.4        | 4                  | 0.6        |
| Letter                    | 3                    | 0.9        | 5                  | 0.7        |
| Editorial material        | 2                    | 0.6        | 1                  | 0.1        |
| Note                      | 2                    | 0.6        | 11                 | 1.6        |
| Correction                | 1                    | 0.3        | 1                  | 0.1        |
| Meeting abstract          | 0                    | 0.0        | 2                  | 0.3        |

**The internationally published leading parasitological journals**
To reveal to what extent Turkish and Iranian parasitologists’ cited journals coincide with the internationally accepted prototype; the most cited foreign journals and their corresponding percentiles are presented in Table 5. These might be served to categorize the three steps in weeding and archiving decisions. This threshold can be adjusted to meet the needs of individual universities, depending upon factors such as available space.

Over the course of the years under investigations, 16980 citations representing 100% of the total number of references of articles indexed in WoS for Iran and 2962 for Turkey have been analyzed and journals were grouped according to Bradford’s Law of scattering (13) to determine zone 1 which consists of a few journals and have received the largest number of citations. In Tables 6-7, the top most cited journals are ranked in descending order. The table also lists first, second and third quartiles of usage for each title. These journals were able to provide more than 28% and 33% of information needs of Iranian and Turkish parasitologists respectively. These can be used for classification of the three chronological steps in weeding and archiving decisions. Again this threshold can be adjusted to meet the needs of individual universities, depending upon factors such as available space.
Table 5: List of 15 core journals related to parasitological subject matters ranked by total cites impact, 5-year impact and impact factor (IF) in descending order

| Rank | Abbreviated Journal Title | Total Cites | IF 5-Year | IF |
|------|---------------------------|-------------|-----------|----|
| 1    | Plos Pathog               | 10833       | 9.079     | 9.675 |
| 2    | Trends Parasitol          | 4464        | 4.906     | 5.285 |
| 3    | Plos Neglect Trop D       | 2020        | 4.752     | 4.849 |
| 4    | Int J Parasitol           | 8331        | 3.822     | 3.938 |
| 5    | Malaria J                 | 4012        | 3.489     | 3.551 |
| 6    | Mol Biochem Parasit       | 7649        | 2.875     | 2.963 |
| 7    | Parasitology              | 7396        | 2.522     | 2.53  |
| 8    | Parasite Immunol          | 2420        | 2.357     | 2.299 |
| 9    | Vet Parasitol             | 9727        | 2.331     | 2.458 |
| 10   | Acta Trop                 | 4527        | 2.262     | 2.5   |
| 11   | Parasitol Int             | 1190        | 2.259     | 2.366 |
| 12   | Parasite Vector           | 272         | 2.13      | 2.14  |
| 13   | Mem I Oswaldo Cruz        | 5385        | 2.058     | 2.081 |
| 14   | Exp Parasitol             | 4218        | 1.869     | 1.841 |
| 15   | Parasitol Res             | 5741        | 1.812     | 1.723 |

Table 6: The 15 most cited journals by Iranian parasitologists and their corresponding quartiles in 2011

| *Rank | Time cited | Journal                   | 25  | 50    | 75  | In Shelf | Active Archive | Passive Archive |
|-------|------------|---------------------------|-----|-------|-----|----------|---------------|----------------|----------------|
| 1     | 695        | Vet Parasitol             | 2005| 2003  | 1998| 6        | 8             | 13             |
| 2     | 492        | Am J Trop Med Hyg         | 2003| 1998  | 1990| 8        | 13            | 21             |
| 3     | 395        | T Roy Soc Trop Med H      | 2002| 1994  | 1983| 9        | 17            | 28             |
| 4     | 361        | Parasitol Res             | 2007| 2005  | 2000| 4        | 6             | 11             |
| 5     | 316        | Int J Parasitol           | 2004| 2000  | 1995| 7        | 11            | 16             |
| 6     | 312        | J Parasitol               | 2000| 1993  | 1972| 11       | 18            | 39             |
| 7     | 308        | Ann Trop Med Parasit      | 2003| 1997  | 1986| 8        | 14            | 25             |
| 8     | 296        | Parasitology              | 2003| 1999  | 1992| 8        | 12            | 19             |
| 9     | 286        | Mol Biochem Parasit       | 2001| 1995  | 1992| 10       | 16            | 19             |
| 10    | 276        | J Clin Microbiol          | 2003| 2000  | 1995| 8        | 11            | 16             |
| 11    | 274        | Infect Immum              | 2003| 1998  | 1994| 8        | 13            | 17             |
| 12    | 241        | Acta Trop                 | 2006| 2003  | 1997| 5        | 8             | 14             |
| 13    | 217        | Iran J Public Health      | 2006| 2003  | 1996| 5        | 8             | 15             |
| 14    | 204        | Exp Parasitol             | 2007| 2000  | 1990| 4        | 11            | 21             |
| 15    | 197        | Vaccine                   | 2006| 2004  | 2001| 5        | 7             | 10             |

*Ranked by number of citations

The “VET PARASITOL” Journal was the most cited journal in both countries. The second most-used journal was “AM J TROP MED HYG” with 429 by Iranian and “PARASITOL RES” with 180 times of citation by Turkish parasitologists. The journal of “T ROY SOC TROP MED H” took third place with 395 by Iranian and “J CLIN MICROBIOL” with 100 times of citation by Turkish parasitologists.

As may be expected, the specialized journals are ranked the highest, whereas journals covering...
Table 7: The 15 most cited journals by Turkish parasitologists and their corresponding quartiles in 2011

| *Rank | Time cited | Journal | 25 | 50 | 75 | In Shelf | Active Archive | Passive Archive |
|-------|------------|---------|----|----|----|----------|----------------|-----------------|
| 1     | 203        | Vet Parasitol | 2007 | 2004 | 1999 | 4 | 7 | 12 |
| 2     | 180        | Parasitol Res | 2008 | 2007 | 2004 | 3 | 4 | 7 |
| 3     | 100        | J Clin Microbiol | 2004 | 2000 | 1995 | 7 | 11 | 16 |
| 4     | 79         | Int J Parasitol | 2005 | 2002 | 1998 | 6 | 9 | 13 |
| 5     | 69         | Parasitology | 2007 | 2003 | 1999 | 4 | 8 | 12 |
| 6     | 55         | Am J Trop Med Hyg | 2004 | 2002 | 1997 | 7 | 9 | 14 |
| 7     | 55         | Acta Parasitol | 2002 | 1996 | 1998 | 9 | 15 | 13 |
| 8     | 45         | Acta Trop | 2008 | 2004 | 2002 | 3 | 7 | 9 |
| 9     | 34         | J Parasitol | 2003 | 2000 | 1998 | 8 | 11 | 13 |
| 10    | 31         | Comp Parasitol | 2006 | 2006 | 2005 | 5 | 5 | 6 |
| 11    | 30         | Mol Biochem Parasit | 1998 | 1993 | 1992 | 13 | 18 | 19 |
| 12    | 29         | Trends Parasitol | 2007 | 2004 | 2002 | 4 | 7 | 9 |
| 13    | 26         | Res Vet Sci | 2007 | 2005 | 1986 | 4 | 6 | 25 |
| 14    | 25         | Ann Trop Med Parasit | 2004 | 2001 | 1990 | 7 | 10 | 21 |
| 15    | 25         | Parasitol Int | 2008 | 2006 | 2005 | 3 | 5 | 6 |

*Ranked by number of citations.

Usage of information resources by Iranian and Turkish parasitologists

To investigate the types of information sources used by Iranian and Turkish parasitologists and their preferred information formats several queries were written to extract relevant information. Table 8 shows the number and percentage of each type of information sources, which were cited by Iranian and Turkish parasitologists for the articles indexed in WoS. Table 8 shows that about 90 percent of the total citations were to Journals, 8-9 percent to Books. There was no citation to web resources.

Table 8: Different information sources usage over the time for the articles indexed in Web of science from 1972 to 2011

| Type of Media     | Turkey | Iran |
|-------------------|--------|------|
|                   | N      | Percent | Half life | N     | Percent | Half life |
| Journal           | 2963   | 89.2    | 11        | 16879 | 90.5    | 12        |
| Book              | 322    | 9.7     | 14        | 1427  | 7.6     | 16        |
| Thesis            | 18     | 0.5     |           | 131   | 0.7     |           |
| Conference material | 12   | 0.4     |           | 139   | 0.7     |           |
| Report            | 5      | 0.2     |           | 36    | 0.2     |           |

Available at: [http://ijpa.tums.ac.ir](http://ijpa.tums.ac.ir)
Trends in the number of articles indexed in WoS journals since 2001
The data for parasitological research based on papers indexed in WoS were analyzed in the present study (Table) to see whether or not the trend found could be extrapolated to predict later growth. Based on distribution of observed articles published between 2001 and 2010, the relationship between the number of articles indexed in WoS by Iranian and Turkish parasitologists (X) and the year of publication (Y) was found to fit an exponential model with the following formula for Iran and Turkey as follows:

\[ Y = 3.987 \times EXP \] (for Iran)
\[ Y = 9.658 \times EXP \] (for Turkey)

The model has been used to construct table 9 showing the expected number of Iranian and Turkish article publications over the next few years. Based on observed data and applied model, it is anticipated that the total number of Iranian and Turkish parasitologists publications in WoS will exceed 2512 and 240 articles per annum in 2020, respectively.

| Year | Observed (per annum) | Year | Predicted from Model (per annum) | Year | Observed (per annum) | Year | Predicted from Model (per annum) |
|------|-----------------------|------|---------------------------------|------|-----------------------|------|---------------------------------|
| 2000 | 4                     | 2011 | 57                              | 2000 | 7                     | 2011 | 138                             |
| 2001 | 8                     | 2011 | 57                              | 2001 | 7                     | 2011 | 138                             |
| 2002 | 12                    | 2012 | 67                              | 2002 | 10                    | 2012 | 190                             |
| 2003 | 18                    | 2013 | 78                              | 2003 | 13                    | 2013 | 263                             |
| 2004 | 19                    | 2014 | 92                              | 2004 | 22                    | 2014 | 363                             |
| 2005 | 25                    | 2015 | 108                             | 2005 | 18                    | 2015 | 501                             |
| 2006 | 29                    | 2016 | 126                             | 2006 | 47                    | 2016 | 692                             |
| 2007 | 42                    | 2017 | 148                             | 2007 | 63                    | 2017 | 955                             |
| 2008 | 41                    | 2018 | 174                             | 2008 | 95                    | 2018 | 955                             |
| 2009 | 36                    | 2019 | 204                             | 2009 | 108                   | 2019 | 1820                            |
| 2010 | 30                    | 2020 | 240                             | 2010 | 123                   | 2020 | 2512                            |

Discussion
The parasitological research output analyzed in this study demonstrated a clear pattern of disseminating research to their readers. This dissemination happened in two ways. First, more than 90% of all the papers published in the time period of our study were original articles. Second, in addition to articles that presented research studies on parasitology, about 90% of references used by authors to develop publications of all types were articles followed by proceeding papers (around 8%). In the other word, when parasitological references were cited, most of these (90%) were to research articles than books, similar to other biomedical and hard sciences (14-16), suggesting the importance of parasitological research in the development of parasitology knowledge. In the medical basic science, Larivière (15) and colleagues found that 93% of all references were citations to journal articles. Because many parasitologists uses journals as part of their professional materials, having access to their favorite journals, for example, in their departments may encourage them to read about research relevant to their practice updates. According to Estabrooks, a cross pollination referencing pattern such as parasitology and veterinary indicates a field that is “not closed
or insular...(but) is open to the infusion of knowledge from other disciplines”(10).

The mean number of citations was 20 per article. Price (17) reported that research articles in hard sciences had an average of 22 references, which was used as a benchmark in a citation analysis study by Vincent and Ross (16). MacRoberts and MacRoberts (18) reported that the average number of citations in biomedical articles was about 20. The citation rate in our study was consistent with those studies. The average number of authors per article was about 5 persons in both countries, comparable with the mode number of authors per article in clinical and life science in Croatia (19).

Although, in both countries, about 96% of Turkish and 94% of Iranian papers have been written in multiple-author status and therefore the trend is toward multi-authorship, but the majority of items published by Iranian researchers have two, three, four, five and six authors. The average number of authors per item was about 4.6 in Iran and 5 in Turkey.

Based on the author’s pervious research, making some incentives such as supporting authors for the papers accepted to be presented in foreign conferences and seminars significantly affected the rate of publication in internationally published journals (20). Therefore it can be seen that the proceedings papers took the second place among cited materials. It is very likely that the growth of original articles is partially due to the growth of number of proceedings paper.

Disseminating research in parasitological journals and using research knowledge as a basis for developing those publications may increase parasitologists’ awareness of research useful to their practice.

Additional efforts are needed in parasitologists education programs at all levels to prepare them for reading, understanding, and evaluating research findings for use in practice.

**Conclusion**

Given that having publications in international journals acquire higher visibility than those in domestic ones (21), Iranian and Turkish parasitologists attempt to increase their publication rate in journals indexed in well-known databases.

Further analysis of papers with regard to the researchers’ collaboration with other countries’ researchers shows that for Turkey, the Japan with 5 co-authored and Australia with 4 co-authored and for Iran Sweden with 5 co-authored and USA with 5 co-authored papers rank first and second, respectively.

Based on the applied model, it is expected that the total number of Iranian and Turkish parasitologists’ paper in WoS to exponentially increase in the near future.

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