International Journal of Information Science and Management
Vol. 22, No. 3, 2024, 1-17
DOI: https://doi.org/10.22034/ijism.2024.1989974.1043 / DOR: https://dorl.net/dor/20.1001.1.20088302.2024.22.3.1.2

Original Research

Open Access Mega Journals: Citation Analysis of the Scientific Publications of Selected Middle East Countries

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Received: 19 February 2023
Accepted: 08 May 2023

Abstract

Mega journals are growing rapidly, and nowadays, they have become new portals for the publication of scientific outputs. The purpose of this study is to analyze the citations of the scientific outputs of Iran, Turkey, Egypt, Saudi Arabia, and Israel in eight mega journals. This applied research, which is a descriptive-analytical study, was conducted by employing a scientometric approach. In this study, eight mega journals were identified and selected based on Bjork's criteria. In each journal, the studies conducted by the researchers of selected countries of the Middle East, and indexed in the Scopus database were searched and extracted from the time the journal was launched as a mega journal to the end of 2019. The total number of studies imported to Excel, SPSS, and VosViewer software for analysis and illustration of the data was 10935. The results showed that approximately 84 percent of the studies performed by the researchers of the selected countries were published in PLOS ONE and Scientific Reports, and the share of the publication for the other six journals accounted for only six percent of the articles. Of the 262696 citations received by these articles, 57.86 percent belonged to the studies published in PLOS ONE. Moreover, PLOS ONE and Scientific Reports were among the most cited sources of the studies carried out in the Middle East. The most active institutes of the Middle East in the eight selected mega journals were Tel Aviv University, King Saud University, Cairo University, and Tehran University of Medical Sciences, respectively. Most of the international collaborations of the selected countries for publication of studies were with the researchers of Medical Sciences of the USA, the UK, and Germany. A considerable share of publications of the selected Middle East countries in the mega journals belonged to PLOS ONE and Scientific Reports. Although the trend of publication in the other journals is also rising, they are not comparable with those two journals. As conducting international studies could increase the rate of citations, it is recommended that researchers increase the impact

of their publications via international collaboration.

Keywords*:* Mega Journal, Citation Analysis, Open Access Mega Journal, Bibliometrics, Middle East, Scientific Publications.

Introduction

Megajournals are online and open-access journals enjoying accurate and expert reviews. Similar to other open-access journals, mega journals are typically funded by Article Processing Charges (APC) (Björk & Catani, 2016). However, mega journals are distinguished from traditional journals by two characteristics. First, unlike academic journals, which have a specific focus on a subject, mega journals cover wide and undefined subject areas. Compared to traditional journals, mega journals publish a larger number of articles in a year. Moreover, mega journals have different approaches to the peer review process; they do not emphasize the traditional approach of selecting manuscripts, i.e., new or important topics. Instead, they publish all manuscripts submitted to the journals, if they are reviewed, audited, and accepted by the journals (Wakeling, Willett, Creaser, Fry, Pinfield & Spezi, 2016; Björk, 2015). Megajournals have rapidly emerged as a new type of scientific journal having accurate reviews; the first journal of this type which is still acknowledged as a model for other journals is *PLOS ONE* from the Public Library of Science which was launched in 2006 (Spezi, Wakeling, Pinfield, Creaser, Fry & Willett, 2017). As soon as *PLOS ONE* obtained an outstanding place in the setting of scientific communication, other acknowledged publishers published topics similar to *PLOS ONE*. One of them was *Scientific Reports* from Nature publication, covering a wide range of topics, similar to *PLOS ONE* (Spezi et al., 2017; Nugent Edriss, Ball & Björk, 2019).

Publishing articles in mega journals has some advantages over traditional journals for research institutes and researchers. Open access to these journals provides a higher opportunity for the published article to be visible and cited (Björk & Catani, 2016; Solomon, 2014). Due to the newness of mega journals, there are fewer quantitative studies in these journals than in traditional journals. At the time of this study, to the best of researchers' knowledge, there is a limited number of studies about the bibliometric analysis of mega journals. The first study was conducted by Fein (2013) who reviewed 28252 articles published in *PLOS ONE* from 2007 to 2011. Burns (2015) reviewed a small sample of 49 articles published in *PeerJ* in the first few months after the journal was launched in 2012. Solomon (2014) conducted a web-based survey of 2128 authors from four mega journals: *PLOS ONE*, *PeerJ*, *BMJ Open*, and *Sage Open* in 2015.

Bjork and Catani (2016) compared the frequency distribution of citations of the articles published in *PLOS ONE* and *Scientific Reports* with the corresponding frequency distribution of citations of articles published in traditional journals (journals other than mega journals). Domnina (2016) reported that the publication trend of *PLOS ONE* was upward from 2006 to 2013 and downward from this date to the end of 2015. The author has also reported the general trend of received citations to be upward. Wakeling et al. (2016) performed the first comprehensive bibliometric analysis of 11 open-access mega journals.

In 2017, Shopovski and Marolov (2017) conducted an online survey of 413 authors in the *European Scientific Journal*, and the results showed that a colleague's recommendation was the main channel and reason for authors to publish an article in this mega journal. Wakeling,

Creaser, Pinfield, Fry, Spezi, Willett and Paramita (2019) carried out an international web-based survey of 11883 researchers. Erfanmanesh (2019) examined eight mega journals in terms of the number of scientific outcomes, the frequency distribution of citations, institutes, and active countries. McGillivray and Astell (2019) performed a study on the relationship between usage and citation in 7222 published articles in *Scientific Reports* between 2012 and 2014. Finally, Syahid (2020) has analyzed the status of open-access journals indexed in Scopus, DOAJ, and Asian Citation Index in ten countries joining the Association of Southeast Asian Nations. More than 40% of reviewed journals were ranked in quartile 2. In Scopus, journals were below the global average in all bibliometric indicators except scholarly output.

Since the late 1960s, with the prevalence of scientometric indices, evaluations have been carried out more scientifically. Nowadays, the scientific evaluation of academic and research institutes of a country is, to a large extent, determined by these indices which are also used in scientific policy-making (Adkins & Budd, 2006; Didegah & Didegah, 2011; Amiri, Saberi, Ouchi, Mokhtari & Barkhan, 2023; Huamani, De Castro, González-Alcaide, Polesel, Tufik & Andersen, 2015). The extent of support given to individuals or institutes is based on the scores they obtain by these scientometric indices (Belinchón, Ramos, Sánchez-Yus & Betlloch, 2004; Leydesdorff, 2004). The most important indices include quantitative indices (the number of researchers, journals, and published articles), and qualitative indices (received citations, Hirsch index of researchers {H-index} and impact factor of journals {IF} in databases of Web of Science and Scopus) (Leydesdorff & Wagner, 2008; BasirianJahromi, Arfaeinia, SeyyedHosseini, Torabi, Sangari & Khosravi, 2022). The present study investigated the scientific outcomes of five Middle East countries (Iran, Turkey, Egypt, Saudi Arabia, and Israel) in eight mega journals from the time the journals were launched to the end of 2019.

To the best of our knowledge, this is one of the first studies investigating the scientific publications of selected Middle East countries in mega journals. This study aimed to investigate the following four indices which are all used in scientometric and bibliometric studies by determining the:

1. journal outcomes, number of published articles of the selected countries of the Middle East, and the changing trend over time
2. most active authors and institutes in the selected journals
3. extent of international collaboration of researchers in the selected countries of the Middle East
4. trend of received citations and the highly cited articles of the authors in the selected Middle East countries in the reviewed meg-journals and the most highly cited sources

Materials and Methods

Criteria for selecting mega journals and the Middle East countries

In this study, we used Bjork's criteria (Björk, 2015), modified by Wakeling et al. (2016), which are the most comprehensive criteria for describing megajournals. There were four main criteria and seven sub-criteria. By searching the literature, publication information, and researchers' expertise, a primary list of about 60 items regarding mega journals was obtained. Given the four main criteria, the journals indexed in Web of Science or Scopus or both were selected, as the information in these databases could be used for a meaningful citation analysis. We selected eight mega journals, indexed in Scopus, and having the four main criteria {large size of the journal (publishing a large number of articles in a year), covering a wide range of

topics, providing a gold-open access model, being peer review, pursuing scientific and research quality instead of novelty and importance of the research}. These journals were: *PLOS ONE*, *Scientific Reports*, *BMJ Open*, *BMC Research Notes*, *PeerJ*, *Medicine (United States)*, *Heliyon*, and *F1000Research*.

In this study, articles written by researchers from the selected Middle East countries "Iran, Turkey, Egypt, Saudi Arabia, and Israel" were examined. The criteria for choosing these five countries was that they have the highest number of scientific publications in the Scopus among Middle East countries[*1]. These countries were Iran, Turkey, Egypt, Saudi Arabia and Israel. In each of these mega journals, the articles published from the time the journal was launched to the end of 2019, were examined. According to our search, the number of articles found was 10935. This study was conducted in 2021; Since an average of two years is required for the citation of scientific productions, scientific productions of up to 2019 were selected so that the required citations would be sufficient and appropriate for the analysis of our research.

Data collection and analysis

First, under Sources in the Scopus database, the selected journals were searched. Then, by using the Country field, the articles were limited to the selected countries. Next, articles published between 2020 and 2022 were removed. The search results were included from the time the journals were launched as mega journals to the end of 2019. The journals' information was examined and the results were extracted and imported into Excel software. For extracting descriptive data related to the citation analysis (the number of articles, citations to the article, mean of citations, etc.), Excel and SPSS software were used. The data were extracted and analyzed from May 22 to June 4, 2021.

Results

Table 1 and Figure 1 are provided in response to the first research question. Table 1 shows the year when the journal was launched and the total number of scientific productions of researchers in the countries of the Middle East. As the table depicts, the lowest number of published articles was in *F1000Research* (169 articles: 1.54%), and the highest number of articles was in PLOS ONE (5596 articles: 51.17%), followed by *Scientific Report* (3526 articles: 32.24%). In other words, these two mega journals publish 83.42% of the publications in the five selected Middle East countries in the given time.

The results in Table 1 show that the highest percent of scientific productions of the selected Middle East countries in the eight mega journals belongs to Israel, Saudi Arabia, Iran, Egypt, and Turkey (33.18, 20.98, 18.69, 14.59, and 12.53) respectively. Moreover, the total number of scientific productions of all five countries in mega journals were: *PLOS ONE*, *Scientific Reports*, *Medicine* with 5596, 3526, and 515 articles (51.17, 32.24, and 4.7 percent), *BMC Research Notes* and *Heliyon* each with 324 articles (96.2 percent), *BMJ Open*, *PeerJ*, and *F1000R*esearch with 270, 211, and 169 articles (2.46, 1.92, and 1.54 percent). The researchers of the selected Middle East countries published the highest number of their scientific productions in *PLOS ONE* and the lowest in *PeerJ* and *F1000*Research.

Table 1
Scientific Publications of The Selected Middle East Countries in Mega journals

Country	**Total** Number (%)	**Plos One (2006-2019)** Number (%)	**Scientific Reports (2011-2019)** Number (%)	**BMC Research Notes (2008-2019)** Number (%)	**Heliyon (2015-2019)** Number (%)	**Medicine*** **(*2014*-2019)** Number (%)	**BMJ Open (2011-2019)** Number (%)	**F1000 Research (2012-2019)** Number (%)	**PeerJ (2013-2019)** Number (%)
Iran	2044 (18.69)	861 (15.38)	655 (18.57)	139 (42.9)	121 (37.34)	98 (19.02)	92 (34.07)	45 (26.62)	33 (15.63)
Turkey	1371 (12.53)	624 (11.15)	416 (11.79)	19 (5.86)	35 (10.8)	183 (35.53)	29 (10.74)	16 (9.46)	49 (23.22)
Egypt	1596 (14.59)	747 (13.34)	512 (14.52)	50 (15.43)	89 (27.46)	83 (16.11)	32 (11.85)	47 (27.81)	36 (17.06)
Saudi Arabia	2295 (20.98)	1080 (19.29)	865 (24.53)	84 (25.92)	62 (19.13)	70 (13.59)	63 (23.33)	22 (13.01)	49 (23.22)
Israel	3629 (33.18)	2284 (40.81)	1078 (30.57)	32 (9.87)	17 (5.24)	81 (15.72)	54 (20)	39 (23.07)	44 (20.85)
Total	10935	5596	3526	324	324	515	270	169	211
Percentage of frequency	--------	51.17	32.24	2.96	2.96	4.7	2.46	1.54	1.92

*The Journal of *Medicine* was published in 1922; however, it began its activity as a mega journal in 2014. Therefore, the articles published in this journal were examined from 2014 to 2019.

Figure 1 illustrates the trend of publication of researchers' articles in the selected Middle East countries in mega journals. The line diagram for each journal begins from the time the journal was launched as a mega journal. As the diagram shows, there is a relatively increasing trend in the publications of the articles in the journals examined. The first phase of growth for some journals, including *PLOS ONE* and *Scientific Reports*, is relatively fast, while it is irregular for other journals; the trend shows decreases and slight increases in publications by year for some journals such as *F1000Research, BMC Research Notes*, and *PeerJ*.

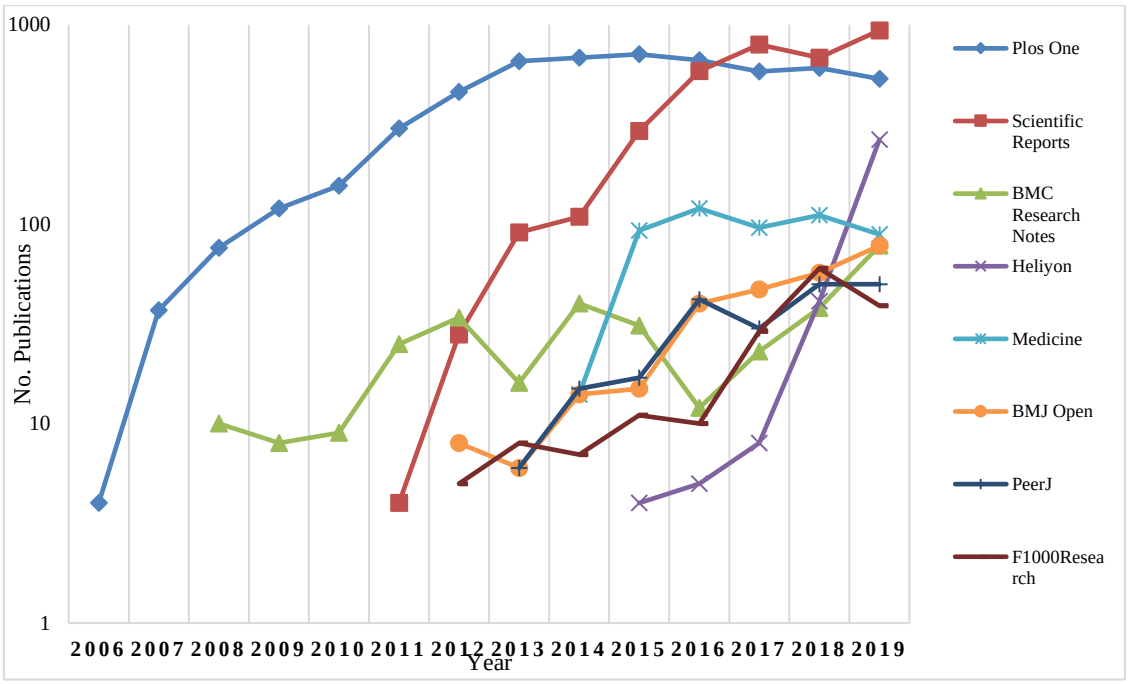

Figure 1: Frequency distribution of documents published by selected Middle East countries in the eight mega journals (by Year)

Figure 2 shows the frequency distribution of received citations of researchers' articles in the selected Middle East countries in mega journals. These figures are presented in response to the fourth research question on the received citations trend. Regarding the five selected countries, the researchers' articles were cited 262696 times (24 for each article). The most received citations of the researchers' articles belonged to Israel, Saudi Arabia, Iran, Egypt, and Turkey (95566, 64735, 41805, 36261, and 28852 citations: 26.33, 28.2, 20.45, 22.71, and 21.04 citation for each article). The trend of received citations (except with the few cases depicted with a slight decrease and increase) shows an overall increase. The articles published in *PLOS ONE* received a total citation of 152001 (27.16 citations for each article) which is 57.86% of the total received citations of all articles published in the other eight journals examined. The lowest number of received citations belonged to the articles published in *F1000Research*, with 1489 citations (8.81 citations for each article), which is 0.56% of the total received citations of all published articles.

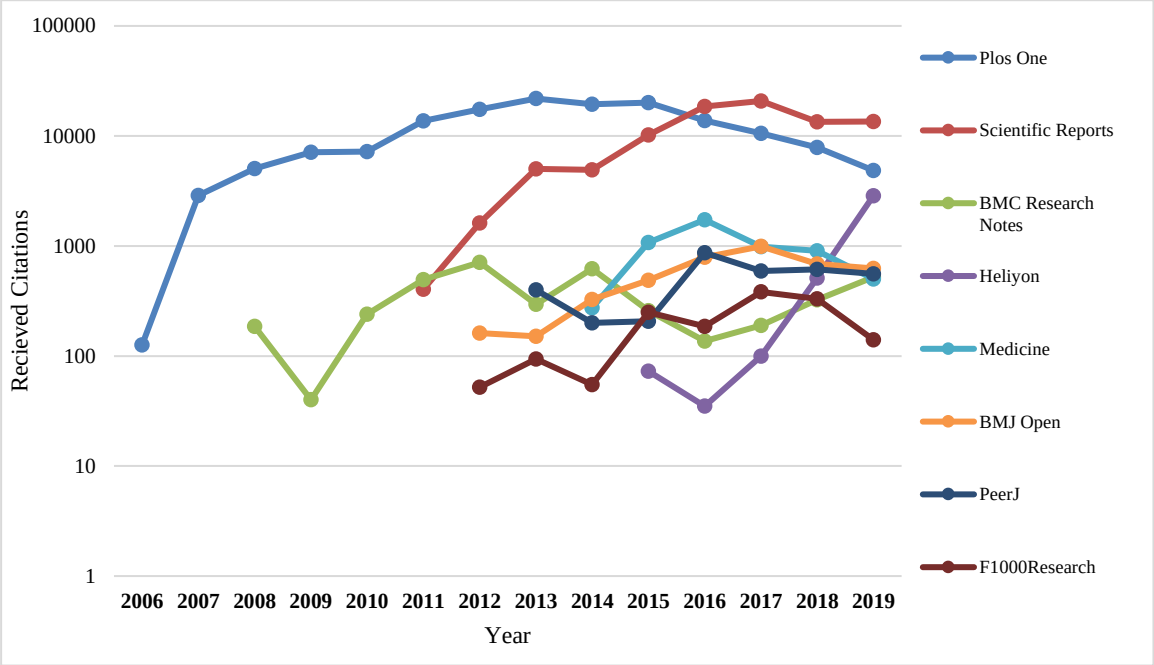

Figure 2: Frequency distribution of received citations by documents published by selected Middle East countries in mega journals (by Year)

Highly prolific and highly cited authors & institutes

This section is written in response to the second research question. In this section, the most prolific authors of the selected Middle East countries in mega journals are presented. Two separate tables (Tables 2 and 3) represent *PLOS ONE* and *Scientific Reports*, as these two journals account for 83.41% of the total scientific publications of the selected Middle East countries in the given period. For the other six journals, 1813 articles were published by researchers in these journals; this number is half of the number of articles published in *Scientific Reports*. A scientific map of the most prolific researchers was drawn for those six journals. As Table 2 shows, no researcher from Egypt and Turkey is present among the 10 most prolific researchers of the selected Middle East countries in *PLOS ONE*. There are three researchers from Iran, three from Saudi Arabia, and four affiliated with universities and research centers in Israel. The most prolific researchers are Hayat and Alsaedi (48 and 38 articles and 2073 and 1627 citations).

Table 2
Top 10 most prolific researchers of the selected Middle East countries in PLOS ONE (2006-2019)

Rank	Author's name	No. of articles	Total citations (rank)	Citation/Documents (rank)	Affiliation/County	H – Index (rank)
1	Hayat, T.	48	2073 (1)	43.18 (2)	Quaid-i-Azam University/Pakistan & Saudi Arabia	33 (1)
2	Alsaedi, A.	38	1627 (2)	42.81 (3)	King Abdulaziz University/Saudi Arabia	29 (2)
3	Azizi, F.	26	706 (4)	27.15 (8)	Shahid Beheshti University of Medical Sciences/Iran	16 (4)
4	Ben-Jacob, E.	20	923 (3)	46.15 (1)	Rice University,	18 (3)

Rank	Author's name	No. of articles	Total citations (rank)	Citation/Documents (rank)	Affiliation/County	H – Index (rank)
					Houston/United States & Israel	
5	Malekzadeh, R.	20	569 (6)	28.45 (7)	Tehran University of Medical Sciences/Iran	16 (4)
6	Bajic, V.B.	17	452 (8)	26.58 (9)	King Abdullah University of Science and Technology/Saudi Arabia	11 (6)
7	Nevo, E.	17	694 (5)	40.82 (4)	University of Haifa/Israel	11 (6)
8	Vlodavsky, I.	15	483 (7)	32.2 (5)	Technion, Haifa/Israel	11 (6)
9	Rechavi, G.	14	423 (9)	30.21 (6)	Tel Aviv University/Israel	12 (5)
10	Haghdoost, A.A.	13	330 (10)	25.38 (10)	Kerman University of Medical Sciences/Iran	10 (7)

Table 3 shows the top 10 most prolific researchers of the selected Middle East countries in *Scientific Reports*. According to the table, one researcher has institutional affiliation with Turkey, four researchers with Israel, and five researchers with Saudi Arabia. The most prolific researchers were Schwingenschlogol and Duarte from Saudi Arabia (23 and 21 articles, 637 and 789 citations, respectively) and Ozbay from Turkey (17 articles and 300 citations). Regarding received citations, Havlin from Israel and Duarte and Voolstra from Saudi Arabia received the highest number of citations (1260,789, and 782, respectively).

Table 3
Top 10 most prolific researchers of the selected Middle East countries in Scientific Reports (2011-2019)

Rank	Author's name	No. of articles	Total citations (rank)	Citation/Documents (rank)	Affiliation/County	H – Index (rank)
1	Schwingenschlogl, U.	23	627 (4)	27.26 (6)	King Abdullah University of Science and Technology/Saudi Arabia	13 (2)
2	Duarte, C.M.	21	789 (2)	37.57 (5)	King Abdullah University of Science and Technology/Saudi Arabia	15 (1)
3	Ozbay, E.	17	300 (8)	17.64 ()	Bilkent Üniversitesi/Turkey	10 (4)
4	Havlin, S.	16	1269 (1)	79.31 (1)	Bar-Ilan University/Israel	15 (1)
5	Zalevsky, Z.	15	133 (9)	8.86 (10)	Bar-Ilan University/Israel	6 (6)
6	Voolstra, C.R.	14	782 (3)	55.85 (2)	Universität Konstanz/Germany & Saudi Arabia	13 (2)
7	Asiri, A.M.	13	553 (5)	42.53 (4)	King Abdulaziz University/Saudi Arabia	11 (3)
8	Yilbas, B.S.	12	319 (7)	26.58 (8)	King Fahd	10 (4)

Rank	Author's name	No. of articles	Total citations (rank)	Citation/Documents (rank)	Affiliation/County	H – Index (rank)
					University of Petroleum and Minerals/Saudi Arabia	
9	Boccaletti, S.	12	300 (8)	25 (9)	CNR-Institute of Complex Systems/Italy & Israel	9 (5)
10	Irigoien, X.	11	494 (6)	44.9 (3)	AZTI Fundazioa/Spain & Israel	9 (5)

In Figure 3, the most prolific researchers of the selected Middle East countries in the six mega journals (*BMJ Open*, *BMC Research Notes*, *PeerJ*, *Medicine*, *Heliyon*, and *F1000Research*) are observed. In this figure, 39 authors with a threshold of five (minimum five articles in six reviewed mega journals) were included in drawing the map. There were 15 researchers from Iran, 10 from Saudi Arabia, six from Egypt, five from Israel, and three with institutional affiliation to Turkey. The most prolific researchers on the list were Kamal (24 articles and 213 citations), Sherief, and Abdelbasset (each with 10 articles and 108 152 citations, respectively). It is worth mentioning that all three researchers had institutional affiliations with Egypt; however, Kamal and Abdelbasset had a second affiliation with Saudi Arabia as well.

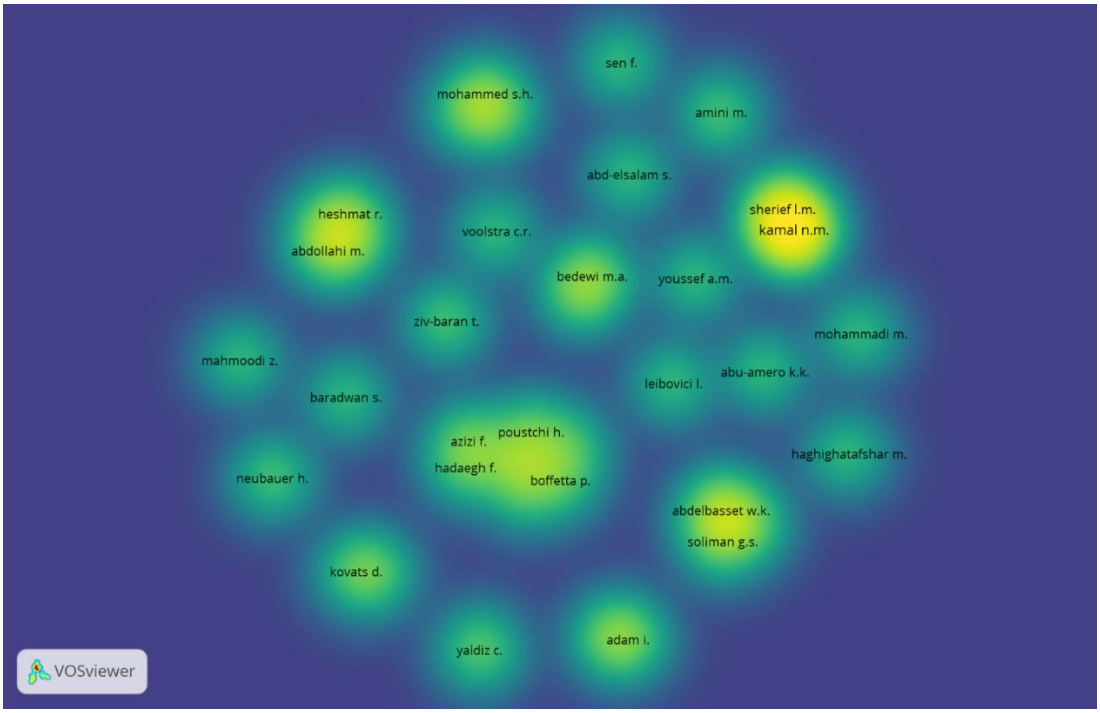

Figure 3: The most prolific researchers of the selected Middle East countries in 6 mega journals

According to the most prolific institutes of the selected Middle East countries in *PLOS ONE*, the most prolific institutions in Israel, Saudi Arabia, Iran, Egypt, and Turkey were Tel

Aviv University, King Saud University, Tehran University of Medical Sciences, Cairo University, and Istanbul Universitesi, respectively (699, 298, 176, 173, and 46 of 2284, 1080, 861, 747, and 624 articles; 30.6, 27.59, 20.44, 23.15, and 7.37 percent).

The most prolific and cited institutions of Saudi Arabia, Israel, Egypt, Iran, and Turkey in *Scientific Reports* were King Abdullah University of Science and Technology, Tel Aviv University, Cairo University, Tehran University (Ministry of Science, Research, and Technology), and Bilkent Universitesi, respectively (307, 285, 104, 101, and 60 articles; 35.49, 26.43, 20.31, 14.51, and 14.42 percent; 12354, 6413, 2536, 2188, and 1714 citations). The most prolific institutes of the selected Middle East countries in the other six journals (*BMJ Open*, *F1000Research*, *Heliyon*, *Medicine*, *PeerJ*, *BMC Research Notes*) were Tehran University of Medical Sciences from Iran (120 articles and 1404 citations), Cairo University from Egypt (115 articles and 906 citations) and Tel Aviv University from Israel (108 articles and 1366 citations).

International Collaboration

This section is in response to the third research question. In 10935 collaborated articles by researchers of Iran, Turkey, Egypt, Saudi Arabia, and Israel in the eight mega journals, 143, 110, 95, 81, and 75 countries, they contributed to the publication of at least 2, 5, 10, 25, and 20 co-authored articles. As shown in Figure 4, the countries with a threshold of 20 articles are included in drawing the map of international collaboration among researchers. The larger size of the frame indicates the higher number of articles published by collaboration in the given country. The most international collaborations of the selected Middle East countries were with the researchers of the USA, UK, Germany, Italy, Canada, China, and France.

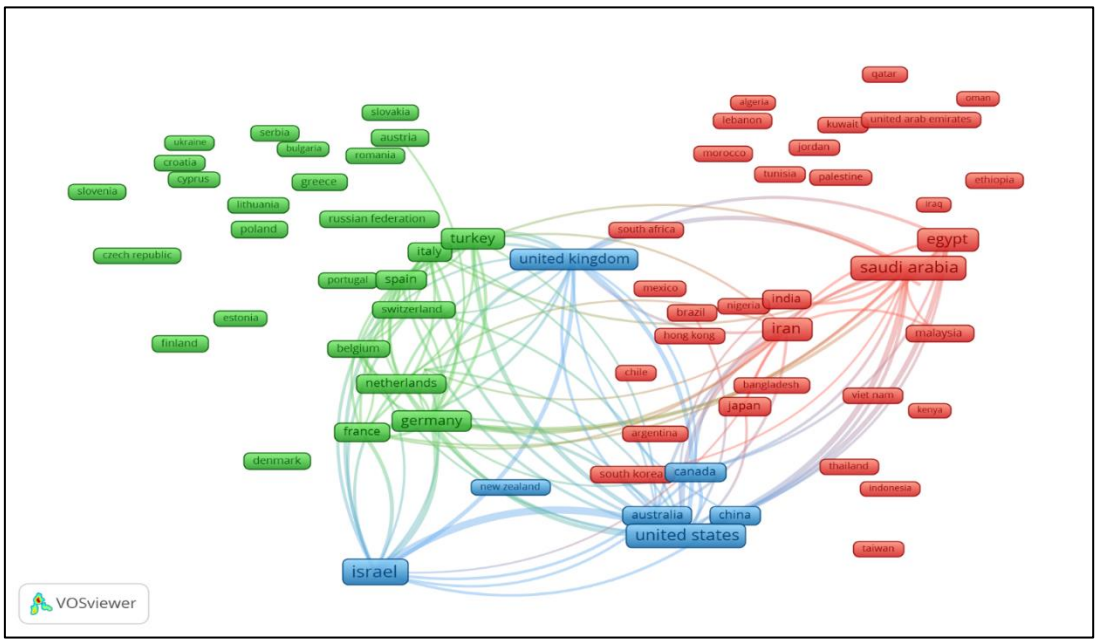

Figure 4: Co-authorship map of countries contributing to the selected Middle East countries in eight mega journals (by the end of 2019)

The most cited articles and sources

This section is presented in response to the fourth research question. Table 4 shows the most cited articles of the researchers of Iran, Turkey, Egypt, Saudi Arabia, and Israel in eight

mega journals. According to the results, all the most cited articles (20 articles) were published in *PLOS ONE* (14 articles) and *Scientific Reports* (6 articles). It is worth mentioning that the number of citations of the articles, one by one, in all six journals was less than 100 (except for an article with 111 citations and two articles with 110 citations).

According to the results of Table 4, there is only one article, entitled "Adverse events associated with immune checkpoint blockade in patients with cancer: A systematic review of case reports" by Egyptian researchers, which is published by international collaboration (in *PLOS ONE* in 2016 with 277 citations). There is no article written by collaboration from Turkey in this list. There are 11, 5, and 2 articles written in collaboration with researchers from Israel, Saudi Arabia, and Iran. Moreover, there is an article, "Rumen microbial community composition varies with diet and host, but a core microbiome is found across a wide geographical range", which was written by a collaboration between Iranian and Israeli researchers and published in *Scientific Research* in 2015 with 639 citations. These 20 articles received a total of 10119 citations in the given time (3.85% from the total citations of 262696)

Figure 5 depicts the map of co-citations of the researchers' cited sources in the selected Middle East countries in the reviewed mega journals. Sources with the threshold of 500 (received citations of a minimum of 500 from the reviewed articles) were included for drawing the map of co-citations in Figure 5. For the high overlaps, many of the sources are not visible on the map. According to the results of the map, many cited sources were *PLOS ONE*, *Nature*, *Science*, *Journal of Biological Chemistry*, *Scientific Reports*, and *Cell*, with 9532, 7774, 6271, 3404, 2932, and 2917 receiving citations, respectively. All these 6 sources are among the leading and top-rank scientific journals.

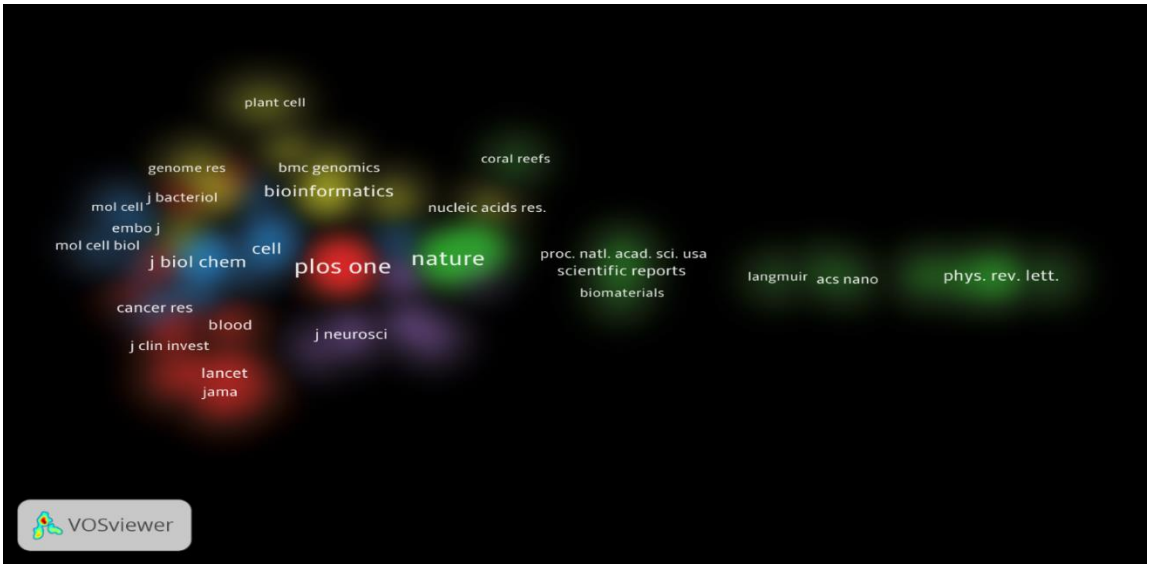

Figure 5: Co-citation map of sources cited by papers authored/co-authored by researchers of the selected Middle East countries in eight megajournals

Table 4
Top 20 highly cited papers of researchers in the selected Middle East countries in eight megajournals

Rank	Title of the article	First author(Year)	Total citations	Title of the journal(the Middle East country)	DOI
1	Insight on Tafel slopes from a microkinetic analysis of aqueous electrocatalysis for energy conversion	Shinagawa, Tatsuya. (2015)	1214	Scientific Reports (Saudi Arabia)	10.1038.srep13801
2	The biodiversity of the Mediterranean Sea: Estimates, patterns, and threats	Coll, Marta. (2010)	1204	Plos One (Israel)	10.1371.journal.pone.0011842
3	Serum microRNAs are promising novel biomarkers	Gilad, Shlomit. (2008)	1136	Plos One (Israel)	10.1371.journal.pone.0003148
4	Conservative fragments in bacterial 16S rRNA genes and primer design for 16S ribosomal DNA amplicons in metagenomic studies	Wang, Yong. (2009)	734	Plos One (Saudi Arabia)	10.1371.journal.pone.0007401
5	Rumen microbial community composition varies with diet and host, but a core microbiome is found across a wide geographical range	Henderson, Gemma. (2015)	639	Scientific Reports (Iran & Israel)	10.1038.srep14567
6	The H19 non-coding RNA is essential for human tumor growth	Matouk, Imad J. (2007)	545	Plos One (Israel)	10.1371.journal.pone.0000845
7	Chronic granulomatous disease: The European experience	Van den Berg, J. Merlijn. (2009)	487	Plos One (Israel)	10.1371.journal.pone.0005234
8	Plastic accumulation in the mediterranean sea	Cózar, Andrés. (2015)	394	Plos One (Saudi Arabia)	10.1371.journal.pone.0121762
9	The age-specific quantitative effects of metabolic risk factors on cardiovascular diseases and diabetes: A pooled analysis	Singh, Gitanjali M. (2013)	355	Plos One (Iran)	10.1371.journal.pone.0065174
10	Fast and fully-scalable synthesis of reduced graphene oxide	Abdolhosseinzadeh, Sina. (2015)	353	Scientific Reports (Iran)	10.1038.srep10160
11	Composition and similarity of bovine rumen microbiota across individual animals	Jami, Elie. (2012)	346	Plos One (Israel)	10.1371.journal.pone.0033306
12	Tumor ablation with irreversible electroporation	Al-Sakere, Bassim. (2007)	338	Plos One (Israel)	10.1371.journal.pone.0001135
13	Active printed materials for complex self-evolving deformations	Raviv, Dan. (2014)	334	Scientific Reports (Israel)	10.1038.srep07422
14	Evaluation of accelerometer-based fall detection algorithms on real-world falls	Bagalà, Fabio. (2012)	324	Plos One (Israel)	10.1371.journal.pone.0037062
15	A model for carbohydrate metabolism in the diatom Phaeodactylum tricornutum deduced from comparative whole genome analysis	Kroth, Peter G. (2008)	313	Plos One (Israel)	10.1371.journal.pone.0001426
16	Inexpensive multiplexed library preparation for megabase-sized genomes	Baym, Michael. (2015)	291	Plos One (Israel)	10.1371.journal.pone.0128036

Rank	Title of the article	First author(Year)	Total citations	Title of the journal(the Middle East country)	DOI
17	Bimetallic metal-organic frameworks for controlled catalytic graphitization of nanoporous carbons	Tang, Jing. (2016)	288	Scientific Reports (Saudi Arabia)	10.1038.srep30295
18	Adverse events associated with immune checkpoint blockade in patients with cancer: A systematic review of case reports	Abdel-Wahab, Noha. (2016)	277	Plos One (Egypt)	10.1371.journal.pone.0160221
19	Accidental degeneracy of double Dirac cones in a phononic crystal	Chen, Ze-Guo. (2014)	274	Scientific Reports (Saudi Arabia)	10.1038.srep04613
20	Potential role of the bovine rumen microbiome in modulating milk composition and feed efficiency	Jami, Elie. (2014)	273	Plos One (Israel)	10.1371.journal.pone.0085423

Discussion

Nowadays, megajournals are a new portal for publication of scientific publications. These journals are growing fast, creating an innovative publication platform in the scientific communication system. Due to covering a wide range of topics, leading to the publication of more articles, compared with other journals, as well as having a peer review that does not emphasize the traditional approach to review (new and important topics), almost the majority of the submitted manuscripts are published in mega journals; thus, researchers and authors, all over the world, submit their manuscripts to these journals. The leading journals of this kind are *PLOS ONE* and *Scientific Reports*, which are also called "scientific giants" these days. These two are currently the largest scientific journals in the world. The present study aimed to conduct a citation analysis of scientific publications of Iran, Turkey, Egypt, Saudi Arabia, and Israel in eight mega journals.

The results indicated that most of the scientific publications of the selected Middle East countries in the given mega journals belonged to Israel, Saudi Arabia, Iran, Egypt, and Turkey, respectively (3629, 2295, 2044, 1596, and 1371 articles). Moreover, about 84% of the 10935 articles of researchers from these countries were only published in *PLOS ONE* and *Scientific Reports*, while the share of the other six journals was only 16%. These findings are in line with the findings of Wakeling et al. (2016) and Erfanmanesh (2019). These researchers have mentioned that a large share of publications belong to these two journals, thereby making other mega journals appear to be non-significant competitors. Although the trend of publication in the other six mega journals is increasing, it is comparatively less than in *PLOS ONE* and *Scientific Reports*.

The trend of received citations of the articles written by researchers of the selected Middle East countries in the mega journals is relatively increasing (except with the few cases associated with a slight decrease and increase). Although Domnina (2016) reported that the publications trend of *PLOS ONE* was upward from 2006 to 2013 and downward from this date to the end of 2015, the findings about received citations are in line with the findings of Domnina. Of the total received citations of 262696 by these articles, 57.86% belonged to published articles in *PLOS ONE*. This could be due to the larger coverage of this journal compared to other journals. The

authors citing the article could also be one of the most important variables, as the authors potentially prefer to cite articles from the leading and scientifically top-ranked journals compared to unknown journals. This issue was observed in the map of co-citation analysis of sources, as the first six most cited sources of the researchers' articles of the selected countries in the mega journals were *PLOS ONE*, *Nature*, *Science*, *Journal of Biological Chemistry*, *Scientific Reports*, and *Cell* which are leading and top-ranked journals. Although the results of Shopovski and Marolov (2017) showed that colleagues' recommendations were the main channel and reason for authors to publish an article in the *European Scientific Journal*, Solomon (2014) has discussed that the reputation of the publisher is an important point for authors. Wakeling et al. (2016), in their study, have introduced *Scientific Reports* as the most cited journal. Erfanmanesh (2019) has also mentioned that *PLOS ONE* was the largest journal in terms of outputs until 2017; however, *Scientific Reports*, becoming the most productive journal, has surpassed *PLOS ONE*.

The lowest number of received citations (0.56%) belonged to articles published by *F1000Research*. Similar to the number of articles, the highest number of received citations belonged to the articles written by authors from Israel, Saudi Arabia, Iran, Egypt, and Turkey. The majority of the articles published in these mega journals received at least one citation. This finding is similar to the findings of Erfanmanesh (2019). All the top 20 highly cited papers of the authors were published in *PLOS ONE* and *Scientific Reports* (14 and 6 articles, respectively). In this regard, the researchers from Turkey had no article, and there was only one article from Egyptian researchers. There were 11, 5, and 2 co-authored articles by the researchers of Israel, Saudi Arabia, and Iran on the list. There was also one article co-authored by researchers from Iran and Israel.

The majority of the active researchers of the Middle East in the reviewed mega journals had institutional affiliations to active institutes of the countries. Turkey had an institute with 60 articles in the given journals; the most active institutes in that country were Bilkent Universitesi, with 60 articles in *Scientific Reports*, and Istanbul Universitesi, with 46 articles in *PLOS ONE*. The most active institutes in Iran, Egypt, Saudi Arabia, and Israel in the given mega journals were *Tehran University of Medical Sciences*, *Cairo University*, *King Saud University*, and *Tel Aviv University*, with 359, 392, 527, and 1092 articles, respectively. Moreover, the most international collaboration in publishing articles in the selected Middle East countries in the mega journals was with the researchers from the USA, UK, Germany, Italy, Canada, China, and France with 2655, 1077, 1000, 568, 563, 541, and 526, respectively. According to Wakeling et al. (2016) and Erfanmanesh, (2019), the most active authors and institutes in mega journals are from China.

Conclusions

This research was an attempt to visualize a portrait of the research studies conducted by researchers from Iran, Turkey, Egypt, Saudi Arabia, and Israel in eight mega journals. The time period for the research was from the time the journals were launched as megajournals to the end of 2019. Basically, bibliometric research is used to show the trend of scientific publications and to evaluate and compare scientific publications, and the current research tends to show this trend in mega journals, which have many positive and negative views. In recent years, despite the growth of mega journals, many criticisms have been made of them, so based on the findings of this article, policymakers and decision-makers around the world, especially in selected

countries of the Middle East, can plan for the future of these publications. Overall, the progress of the number of articles shows that mega journals have found a place among other scientific journals.

Megajournals do not revolutionize the industry and the way peer review works, but they meet the needs of certain groups of authors by providing faster publishing, better submission predictability, and reasonable brand recognition in publishing lists. The researchers believe that the negative perceptions of mega journals, with their wide subject scope and lack of filter for importance and interest, are caused by the belief that they do not adequately meet the needs of communities. This raises important issues for mega journal publishers, who clearly have yet to convince many researchers that their approach adds significant value to the scholarly communication ecosystem. With more data collected, we hope other researchers will be interested in this topic and conduct a systematic study. Primary data are available through citation indexes.

Typically, the bibliometric studies provide responses to many research questions as well as raising new questions and providing suggestions in the framework of new research. As an example, citation analysis of scientific publications of Middle East countries (all or selected) in selected mega journals or other journals is suggested for a new research study. Moreover, to complement the results of this kind of research, altmetric techniques could also be used. Further studies on bibliometric and altmetric in mega journals, along with illustrative research in this context, are recommended. This research was limited to the bibliometric analysis of scientific publications of five countries in eight mega journals by employing data from the Scopus database. Thus, further research with a larger population and data from other citation databases, including Web of Science and Google Scholar, is also recommended.

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