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SHORT-TERM IMPACT OF COVID-19 PANDEMIC ON THE PERFORMANCE OF GLOBAL AND TURKISH SCIENTIFIC PUBLICATIONS

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ABSTRACT

Covid-19 research studies have been performed by a wide variety of research groups in Turkey as well as the rest of the world. This study aims to make a bibliometric analysis of the scientific publications based on the Covid-19 pandemic around the world and in Turkey. The Web of Science database was scanned using the keywords "Covid-19", "Coronavirus", "Coronavirus disease", "Covid-19 pandemic" and "Coronavirus pandemic". This study included all types of scientific publications related to Covid-19 published in all languages between January 1, 2020 and October 30, 2021 without restrictions. Identification and analysis of the data were based on criteria such as countries, scientific publications, institutions, citation count, h-index, and some relationships between these variables. Descriptive features of scientific publications were analyzed in Microsoft Excel. The findings emphasize that the number of scientific publications in the Covid-19 research field steadily increased. However, researchers should increase diversity in some Covid-19 research fields rather than health, such as social and humanities science studies and interdisciplinary studies. So, universities should focus more on these fields.

Keywords: Bibliometric analysis; Covid-19; higher education; scientific publications; Turkey

COVID-19 PANDEMİSİNİN DÜNYA'DA ve TÜRKİYE'DE BİLİMSEL YAYIN PERFORMANSI ÜZERİNDEKİ KISA DÖNEMDEKİ ETKİSİ

ÖZET

Covid-19 ile ilgili çalışmalar Dünya'da olduğu gibi Türkiye'de de çok çeşitli araştırma grupları tarafından yapılmaktadır. Bu çalışma, Dünya'da ve Türkiye'de Covid-19 pandemisi ile ilgili yapılan bilimsel yayınların bibliyometrik analizini yapmayı amaçlamaktadır. Bu amaçla Web of Science veri tabanı, "Covid-19", "Koronavirus", "Koronavirus hastalığı", "Covid-19 pandemisi" ve "Koronavirus pandemisi" anahtar kelimeleri kullanılarak taranmıştır. Bu çalışma, 1 Ocak 2020 ile 30 Ekim 2021 tarihleri arasında kısıtlama olmaksızın tüm dillerde yayınlanan Covid-19 ile ilgili veri tabanında yer alan tüm bilimsel yayınları

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içermektedir. Verilerin belirlenmesi ve analizinde ülkeler, bilimsel yayınlar, kurumlar, atıf sayısı, h-endeksi gibi değişkenler ve bu değişkenler arasındaki bazı ilişkiler esas alınmıştır. Bilimsel yayınların tanımlayıcı özellikleri Microsoft Excel'de analiz edilmiştir. Bulgular, Covid-19 ile ilgili yapılan bilimsel yayınların sayısının giderek arttığını göstermektedir. Ancak bulgular araştırmaların sağlık alanı dışında sosyal ve beşeri bilimler ile disiplinler arası çalışmalar alanında da çeşitliliğinin artırılmasının gerektiğini göstermekte olup, üniversitelerin bu alandaki çalışmalara daha fazla odaklanmaları gerektiğine işaret etmektedir.

Anahtar kelimeler: Bibliyometrik analiz; Covid-19; yükseköğretim; bilimsel yayın; Türkiye

INTRODUCTION

The Coronavirus disease (Covid-19) is a new strain discovered in China in late 2019 that has not previously been identified in humans or the world. On March 11, 2020, the World Health Organization (WHO) officially declared the Covid-19 outbreak as a pandemic due to the global spread and severity of the disease. Before Covid-19, there were four pandemics in the last two centuries: "Spanish Flu" in 1918, the "Asian Flu" in 1957, the "Hong Kong Flu" in 1968, and swine flu in 2009 (Açıkgöz & Günay, 2020). Globally, as of October 29, 2021, there have been 245.373.039 confirmed cases of Covid-19, including 4.979.421 deaths. Besides, a total of 6.838.727.352 vaccine doses have been administered until October 29th, 2021 (WHO, 2021).

The world is still in the midst of the Covid-19 crisis, and many uncertainties remain. In the immediate response to the Covid-19 crisis, science and innovation are playing essential roles in providing a better scientific understanding of the virus, as well as in the development of vaccines, treatments, and diagnostics. Both the public and private sectors have poured billions of dollars into these efforts, accompanied by unprecedented levels of global cooperation (OECD, 2021a). In the short term, governments and researchers have responded strongly and flexibly to the Covid-19 pandemic. Today, they continue their support for science and innovation activities that aim to develop solutions to the pandemic and mitigate its negative impacts, while paying attention to the uneven distributional effects of Covid-19 pandemic. Moreover, it has further opened access to data and scientific publications, increased the use of digital tools, enhanced international collaboration and spurred a variety of public and private partnerships. Hence, these developments have led to an acceleration in the transition to more research (OECD, 2021b).

Therefore, this study aims to analyze the existing scientific studies in the literature on the Covid-19 pandemic in line with the criteria determined by the bibliometric analysis method. Bibliometric analysis was used to determine the distribution of scientific publications by country, institution, publication type, and research fields to provide insight on current studies' descriptive features. Given the urgency of the Covid-19 pandemic and the need to understand and access information about it, a bibliometric analysis was considered suitable for this study. It is believed that it will benefit the literature to reveal the general structure of the Covid-19 research area and thereby propose recommendations for future research on Covid-19. On the other hand, considering the lack of studies in the literature both on a global scale (Lv et al., 2020; Rahim et al., 2021; Wang & Tian, 2021) and in Turkey (Kaya&Erbay, 2020; Çiftçiler, Haznedaroğlu, Tufan, & Zürk, 2021), this study might fill the research gap related to

Covid-19. Besides, scientific publications are key indicators for measuring universities' performance around the world. For example, university rankings such as Times Higher Education World University Ranking (THE) and ShanghaiRanking's Academic Ranking of World Universities (ARWU) use the number of scientific publications published in international indexed journals as a performance indicator for the calculation of ranking scores of universities (THE, 2021; ARWU, 2021). Hence, this study might provide some insights into the performance of the overall higher education system and universities during the Covid-19 pandemic.

In this context, the organization of the paper is as follows: The next section discusses the methodology of this study, while the third section lays out the findings. The next one is focused on the overall analysis of the findings, and finally, the study is concluded.

METHOD

Bibliometric analysis is a widely used research method for detecting the state of the picture in a particular field. This method is capable of utilizing quantitative analysis and statistics to describe patterns of scientific publications within a given period or body of literature (Dereli et al., 2011; Kaya & Erbay, 2020). A bibliometric analysis is defined as a statistical evaluation of published journal papers, books, or other scientific articles, and it is an effective way to measure the influence of scientific publications, scholars, or institutions in the scientific community (Encylopedia, 2021).

One favourable way of conducting bibliometric analysis has been through searching for scientific publications listed on Thomson Reuters' Web of Science (WoS). With this goal in mind, a list of scientific publications on Covid-19 was compiled by searching the WoS with Conference Proceedings, consisting Science Citation Index-Expanded (SCI-E), Social Science Citation Index (SSCI), Emerging Sources Citation Index (ESCI), Conference Proceedings Citation Index-Science (CPCI-S), Conference Proceedings Citation Index-Social Science&Humanities (CPCI-SSH), Art&Humanities Citation Index (A&HCI), Book Citation Index-Science (BKCI-S), Book Citation Index-Social Sciences&Humanities (BKCI-SSH), Index Chemicus (IC) and Current Chemical Reactions (CCR-Expanded) databases (WoS Core Collection, 2021). In order to conduct the analysis, first the criteria for data collection were determined. The keywords used for the data collection are "Covid-19", "Coronavirus", "Coronavirus disease", "Covid-19 pandemic", and "Coronavirus pandemic". These keywords were searched in the "all fields" title in the WoS since the "all fields" searches all of the searchable fields using one query, which allows us to easily find researched search terms in any field. Besides, this study included all document types of scientific publications in the WoS, such as articles, editorial materials, letters, review articles, meeting abstracts, books, book chapters, book reviews, proceeding papers, early access, data papers, expression of concern, corrections, reprints, etc. related to Covid-19 published in all languages between January 1, 2020 and October 30, 2021 without restrictions.

The data was extracted from the WoS database according to the data collection criteria. After setting the suitable output formats, the data was imported into Microsoft Excel, which was used to organize and analyze the data, including the publication number, country, document type, universities, institutions, citation count, WoS index category, and the research area. It is important to note that the total number of scientific publications by countries might not be equal to the total number of overall scientific publications since one study might include authors from more than one country.

FINDINGS

As a result of the database research, it was found that a total of 194.736 scientific publications have been published around the world since the beginning of the pandemic. Firstly, the distribution of scientific publications by countries was assessed, and it was identified that, with 54.684 scientific publications, the United States of America (USA) has contributed to the majority of the research in the Covid-19 field. The USA was determined as the most productive country, followed by China (20.113) and England (18.859). As seen in Figure 1, which shows the top 15 countries in terms of scientific publication distribution in the Covid-19 research field, the rank of Turkey was 12, with 5.216 scientific publications.

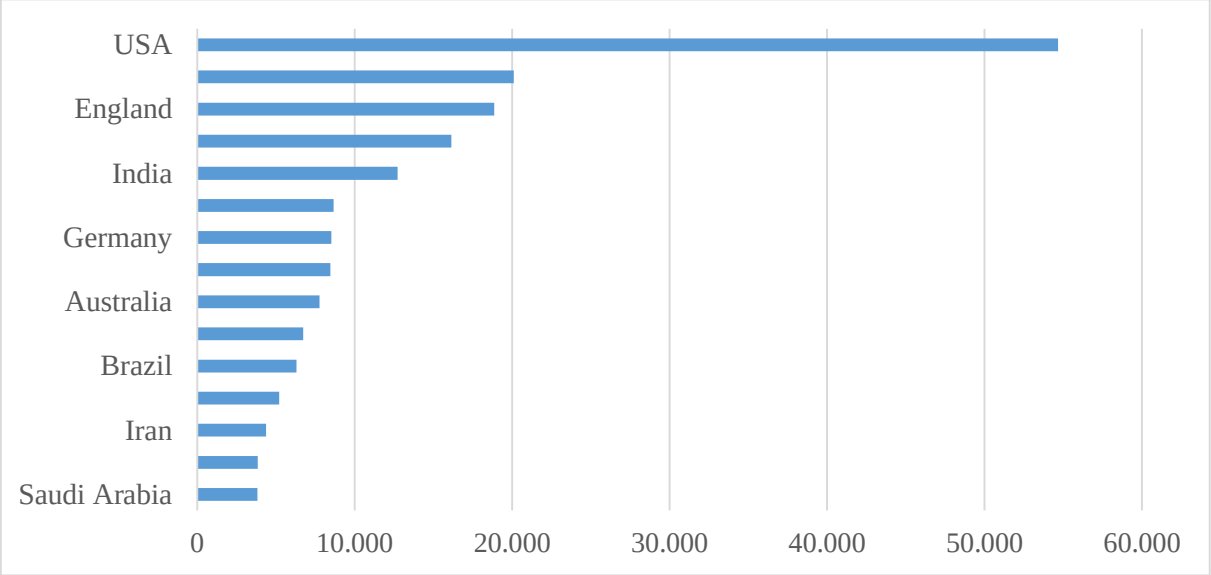

Figure 1. Distribution of Scientific Publications by Country

Descriptive characteristics of scientific publications, including citation count, average citation per publication, and h-index, were also analyzed in Table 1. However, since a citation report is only available for 10.000 records or fewer in the WoS, only countries having fewer than 10.000 scientific publications could be analyzed among the 15 top countries, so the USA, China, England, Italy, and India could not be included in this analysis. Germany (70.046), Canada (63.915), and Australia (62.150) are the top three countries according to the number of cited articles. The top three countries with the highest average number of citations per publication are France (15,61), Germany (15,35), and Australia (12,66).

The top three countries with the highest h-index are Germany (142), France (132), and Canada (128). Besides, the top three countries with the highest number of times cited are Germany (130.957), France (104.993), and Canada (102.286). Turkey is in last place regarding the number of cited articles (20.228), times cited (27.438), average citations per publication (5,26), and h-index (60) in Table 1. Therefore, Turkey's productivity of scientific publications based on the Covid-19 research field is at the bottom among these ten countries.

Table 1. Descriptive Characteristics of Scientific Publications by Country

Country	Publications	Cited Articles	Times Cited	Average per item	h-index
Australia	7.766	62.150	98.334	12,66	122
Brazil	6.316	39.759	56.113	8,89	83
Canada	8.462	63.915	102.286	12,06	128
France	6.726	57.686	104.993	15,61	132
Germany	8.530	70.046	130.957	15,35	142
Iran	4.372	23.240	33.652	7,7	72
Japan	3.846	28.339	38.852	10,1	80
Saudi Arabia	3.837	21.081	28.294	7,37	63
Spain	8.668	49.468	83.995	9,69	108
Turkey	5.216	20.228	27.438	5,26	60

Table 2 displays the distribution of scientific publications by document type. It is important to note that the number of scientific publications presented in Table 2 is slightly different than the total number in Table 1, since most likely some studies might have early access formats or authors from more than one country. Among all global scientific publications, 116.666 were original research articles, 22.540 were editorial materials, and 19.070 were review articles. Similarly, 3.767 of them were original research articles, 677 of them were editorial materials, and 483 of them were review articles in Turkey. As a result, according to the COVID-19 research field, Turkey has a similar trend to the other countries in the distribution of scientific publication types.

Table 2. Distribution of Scientific Publications by Document Type

	World	Turkey
Articles	116.666	3.767
Editorial Materials	22.540	677
Letters	20.868	575
Review Articles	19.070	483
Early Access	13.080	263

Table 3 shows the distribution of scientific publications by the WoS index. Considering this, SCI-Expanded (138.381), SSCI (42.256) and ESCI (36.292) are the top three WoS indexes. On the other hand, SCI-Expanded (3.523), ESCI (1.299) and SSCI (808) are the top three indexes in WoS for

Turkey's Covid-19 scientific publications. Therefore, scientific publications related to the Covid-19 research field in SSCI are lower in Turkey when compared to the world.

Table 3. Distribution of Scientific Publications by the Web of Science Index

	World	**Turkey**
SCI-Expanded	138.381	3.523
SSCI	42.256	808
ESCI	36.292	1.299
CPCI-S	4.165	39
A&HCI	1.437	27
CPCI-SSH	472	2
BKSI-S	120	1
BKSI-SSH	99	-
IC	58	1
CCR-Expanded	9	-

Table 4 lists the top 10 research areas for the Covid-19 around the world. "Medicine General Internal" and "Public Environmental Occupational Health" are the top two research areas according to the scientific publications in the world and Turkey. However, it is important to note that research areas including "Immunology", "Multidisciplinary Sciences", "Environmental Sciences" and "Medicine Research Experimental" are not among the top ten research areas in Turkey. Table 4 indicates that the Covid-19 scientific publication studies are mostly focused on health studies around the world so far.

Table 4. Distribution by Research Areas

	World		**Turkey**	
	Publications	**%**	**Publications**	**%**
Medicine General Internal	21.782	11,186	815	15,625
Public Environmental Occupational Health	16.703	8,577	203	3,892
Infectious Diseases	9.449	4,852	146	2,799
Immunology	7.306	3,752	137	2,442
Multidisciplinary Sciences	6.880	3,533	66	1,176
Environmental Sciences	6.839	3,512	111	1,978
Pharmacology Pharmacy	6.550	3,364	286	5,483
Psychiatry	6.251	3,21	253	4,850
Surgery	5.961	3,061	150	2,876
Medicine Research Experimental	5.730	2,942	105	1,871

As seen in Table 5, the productivity or performance of the institutions during the pandemic can be expressed by analyzing the number of their scientific publications. While the University of London in England (5.184) is the best performer among institutions during the pandemic, the University of Health Sciences in Turkey (613) is ranked first in Turkey. While globally, 15 universities are among the

top 20 most productive institutions on the basis of Covid-19 studies, this number is 18 in Turkey. Besides, eight research and candidate research universities are on the list in Turkey.

Table 5. Top 20 Most Productive Institutions in Covid-19 Scientific Publications

World		Turkey	
Institution	**Publication**	**Institution**	**Publication**
University of London	5.184	University of Health Sciences	613
Harvard University	5.047	Hacettepe University	352
University of California System	4.333	Istanbul University	282
Harvard Medical School	2.979	Istanbul University-Cerrahpasa	215
University of Toronto	2.360	Ankara University	210
University College London	2.318	Gazi University	189
Institut National De La Sante Et De La Recherce Medicale Inserm	2.291	City Hospital Ankara	186
University of Texas System	2.233	Marmara University	153
Johns Hopkins University	2.129	Koc University	147
Huazhong University os Sdcience Technolohy	1.932	Ankara Yildirim Beyazit University	140
University of Oxford	1.926	Sakarya University	135
Assistance Publique – Hôpitaux de Paris	1.915	Istanbul Medeniyet University	134
Egyptean Knowledge Bank	1.912	Ege University	131
Imperial College London	1.836	Selcuk University	123
State University System of Florida	1.797	Ministry of Health Turkey	122
Pennsylvania Commonwealth System of Higher Education	1.706	Erciyes University	121
University of Milan	1.586	Dokuz Eylul University	116
University of Pennsylvania	1.583	Ondokuz Mayis University	114
Columbia University	1.560	Atatürk University	111
Massachusetts General Hospital	1.541	Necmettin Erbakan University	101

DISCUSSION AND CONCLUSION

This study analyzed the scientific publications about the Covid-19 pandemic in the WoS database in the period of January 1, 2020–October 30, 2021. In sum, a total of 194.736 scientific publications related to the Covid-19 research fields were obtained around the world, while Turkey's total number of scientific publications was 5.216 in the same period. Furthermore, while the USA was the most productive country in the world with 54.684 publications, Turkey's rank was 12 in the world. In addition, the top countries with the highest citation count, the highest average number of citations per publication, and the highest h-index are Germany (130.957), France (15,61) and Germany (142), respectively, among the best-performing countries except the USA, China, England, Italy, and India. Turkey had the lowest average number of citations per publication (5,26) and h-index (60) among them. Most published scientific studies were research articles, which were mostly published in SCI-Expanded

around the world and in Turkey. Besides, "Medicine General Internal" was the top research area based on Covid-19 studies both in the world and Turkey. However, the findings show Turkey partially differs from the research area trend compared to the world. Lastly, the findings indicate that universities were the most productive institutions in the Covid-19 pandemic study around the world.

Moreover, this study can help researchers identify research gaps related to the Covid-19 pandemic and conduct studies to fill them. For this purpose, a bibliometric analysis was conducted to search and evaluate scientific publications listed in WoS at the short-term stage of the pandemic. Furthermore, the sample size of WoS is sufficient to illustrate the state of research and quality and identify research gaps related to Covid-19 at the onset of the pandemic since journals indexed in WoS are accepted as the most prestigious ones.

On the other hand, this study also has some limitations. Because of the delay in indexing, some studies published as at October 30, 2021 may not have been identified in the WoS. Besides, because our retrieval time was only until this date, articles published or posted after this date, of which there have been many, have not been included in the analysis. Also, since the citation reports for the USA, China, England, Italy, and India couldn't be reached due to the limitations in the Wos, some of the top performing countries' analysis is missing from this study.

In this study, bliometric analysis shows the current situation of literature published related to the Covid-19 pandemic as of October 30, 2021. The number of scientific publications in this field has steadily increased since the outbreak of the pandemic. However, since health studies dominated the research on Covid-19, more diversity in scientific publications is needed, especially for social and humanities science studies and interdisciplinary studies, to improve evidence for the development of social and economic life guidelines and public policies during the pandemic. Moreover, the findings of this study might be useful to improve universities' performance on Covid-19 studies; hence, their overall research performance might increase.

REFERENCES

Açıkgöz, Ö., & Günay, A. (2020). The early impact of the Covid-19 pandemic on the global and Turkish economy. *Turkish Journal of Medical Sciences, 50,* 520-526. doi:10.3906/sag-2004-6.

Çiftçiler, R., Haznedaroğlu, İ.C., Tufan, A., & Öztürk, M.A. (2021). Covid-19 scientific publications from Turkey. *Turkish Journal of Medical Science, 51*(3), 877-889. doi:10.3906/sag-2010-261.

Dereli, T., Baykasoglu, A., Altun, K., Durmusoglu, A., &Türksen, I.B. (2011). Industrial applications of type-2 fuzzy sets and systems: A concise review. *Computers in Industry, 62*(2), 2011, 125-137. doi: 10.1016/j.compind.2010.10.006

Encylopedia (2021). *Bibliometric Analysis*. Retrieved from https://encyclopedia.pub/2024

Kaya, M., & Erbay, E. (2020). Global Trends of the researches on COVID-19: A bibliometric analysis via VOSviewer. *Journal of Ankara Health Sciences, 9*(2), 201-216. doi: 10.46971/ausbid.817925

Lv, M., Xufei, L., Janne, E., Yunlan, L., Mengjuan, R. et al. (2020). Coronavirus disease (COVID-19): a scoping review. *Euro Surveill, 25*(15), 2000125. doi: 10.2807/1560-7917.ES.2020.25.15.2000125.

OECD (2021a). *OECD Science, Technology and Innovation Outlook 2021: Times of Crisis and Opportunity*, Paris, OECD Publishing. doi:10.1787/75f79015-en.

OECD (2021b). *STI Outlook recommendations*. Paris: Organisation for Economic Cooperation and Development. Retrieved from https://www.oecd.org/sti/science-technology-innovation-outlook/

Rahim, F., Khakimova, A., Ebrahimi, A., Zolotarev, O.,& Rafiei Nasab, F. (2021). Global Scientific Research on SARS-CoV-2 Vaccines: A Bibliometric Analysis. *Cell Journal, 23*(5): 523-531. doi: 10.22074/cellj.2021.7794.

Shanghai Ranking's Academic Ranking (2021). *ShanghaiRanking's Academic Ranking of World Universities Methodology 2021*. Retrieved from https://www.shanghairanking.com/methodology/arwu/2021.

The Times Higher Education World University Ranking (2021). *THE World University Rankings 2021: Methodology*. Retrieved from https://www.timeshighereducation.com/world-university-rankings/world-university-rankings-2021-methodology.

Wang, P., & Tian, D. (2021). Bibliometric analysis of global scientific research on COVID-19. *Journal of Biosafety and Biosecurity*, *3*(1), 4-9. doi: 10.1016/j.jobb.2020.12.002.

Web of Science Core Collection (2021). *Explore Web of Science Core Collection indices*. Retrieved from https://clarivate.com/webofsciencegroup/solutions/web-of-science-core-collection/

World Health Organization (2021). *WHO coronavirus (COVID-19) dashboard*. Retrieved from https://covid19.who.int/