International Journal of Current Advanced Research
ISSN: O: 2319-6475, ISSN: P: 2319-6505, Impact Factor: 6.614
Available Online at www.journalijcar.org
Volume 9; Issue 04 (C); April 2020; Page No.21985-21989
DOI: http://dx.doi.org/10.24327/ijcar.2020.21989.4330

Research Article

MAP OF TRENDS IN SCIENTIFIC PRODUCTION IN COVID-19: BIBLIOMETRIC ANALYSIS

[1,2]* Torres-Pascual, C., [2,3] Àvila-Castells, P., [4] Torrell-Vallespín, S., [2,5] Sánchez-Pérez, HJ., and [2,6] Romero-Sandoval, N

[1]Escola Universitària de la Salut i l'Esport. Universitat de Girona, Girona, España
[2]GRAAL; Barcelona, España
[3]Universitat de Girona, Girona, España
[4]Hospital de l'Esperança. Universitat Autònoma de Barcelona, Barcelona, España
[5]El Colegio de la Frontera Sur, ECOSUR, Chiapas, México
[6]Escuela de Medicina, Universidad Internacional del Ecuador, Quito, Ecuador

A R T I C L E I N F O

Article History:
Received 24th January, 2020
Received in revised form 19th February, 2020
Accepted 25th March, 2020
Published online 28th April, 2020

Key words:
COVID-19, SARS-Cov-2 infection, bibliometric analysis, research collaboration

A B S T R A C T

Based on a bibliometric study, this study shows published research trends related to the COVID-19 pandemic. For this, the databases PubMed, Scopus, Web of Science, Cochrane and DOAJ (12/01/19 to 04/01/2020) were consulted. 2,748 documents published in 820 journals were consulted. Production growth has been exponential R2=0.99. According to the productivity index, prolific authors (0.20%), medium producers (16.33%) and occasional authors (83.47%) were identified. The main countries by volume of work and international collaboration in the period analysed are China (53.31%), the United States (21.43%) and Italy (11.75%). 78.96% of the articles are co-authored 6.73±6.25 and 11.86% an international collaboration rate 2.85±1.74. The magazines with more than 50 works are: British Medical Journal, New England Journal of Medicine, Nature and JAMA. 91.30% is published in English. The impact of COVID-19 worldwide requires studies, preferably in international collaboration, in order to establish health policies at a global level.

INTRODUCTION

COVID-19 is a new infectious disease caused by the SARS-CoV-2 virus, whose first outbreak appeared in the city of Wuhan (China) between November and December 2019 (OMS, 2020). Following the rapid spread of the virus, on March 11, 2020 the World Health Organization (WHO) raised the outbreak to the category of pandemic (Lai *et al*., 2020). COVID-19 refers to the spectrum of clinical manifestations presented by humans infected with this virus (Gorbalenya *et al*., 2020).

According to data from the study by Russell *et al*., The virus case fatality rate was calculated to be 2.3% (95% CI 0.75% to 5.3%) per confirmed case and 1.2% per infected case (95% CI 0.38% to 2.7%) (Russell *et al*., 2020). The proportion of asymptomatic positive people was 17.9%, reaching 39.9%) (Kenji *et al*., 2020).

Despite the efforts being made to find an effective treatment and the speed the efforts and speed to find an effective treatment, the number of cases. with which it is being investigated, the number of cases is increasing day by day. As of April 29, 2020, nearly 3 million positive cases and 207,973 deaths have been confirmed worldwide (WHO, 2020).

Corresponding author:* **Torres-Pascual, C
Escola Universitària de la Salut i l'Esport. Universitat de Girona, Girona, España

Between December 2019 and March 2020, multiple scientific studies based on epidemiological data and clinical experiences on SARS-CoV-2 have been carried out. Obtaining information from them is crucial for improving diagnosis, prognosis, finding a safe and effective therapeutic intervention, and prevention strategies to deal with this pandemic. It is essential to understand the evolution of emerging scientific knowledge about COVID-19 in order to inform health actors, and thus be able to establish new evidence-based policy strategies. In this context, bibliometric studies can help researchers to obtain information on the state of research, advance prevention and intervention strategies, and ultimately accelerate the process of adapting health policies (Nasab *et al*., 2020), starting from the Critical information on the authors, institutions, countries in which they are published, the most cited research or co-authorships and guidelines for collaboration (Chahrour *et al*., 2020). Thus, despite the short period of publication, bibliometric studies have already been carried out on COVID-19 that analyse production at a global level (Nasab *et al*., 2020 Chahrour *et al*. 2020; Lou *et al*., 2020).

The present bibliometric study analyses the trend in the scientific production of COVID-19, based on the consultation of the five most voluminous bibliographic databases on human health.

MATERIALS AND METHODS

The analysis carried out was based on a descriptive study with a bibliometric approach. The records were retrieved from PubMed, Scopus, Web of Science, Cochrane and DOAJ from December 01, 2019 to April 01, 2020. The search terms were: COVID-19, 2019 novel coronavirus infection, COVID19, coronavirus disease 2019, coronavirus disease-19, 2019-nCoV disease, 2019 novel coronavirus disease, 2019-nCoV infection and SARS-COV-2. After eliminating repeated, incomplete, or records that did not correspond to the study topic (n = 438), the analysed production consisted of 2,748 records.

The total scientific production was calculated by the number and percentage of indexed articles and most used keywords. Production growth was measured through the growth rate and observation of the trend by the exponential growth equation (R2) and authors' productivity to identify prolific authors (≥ 10 papers), medium producers (between 2 and 9 documents) and small producers (a single publication) (Price *et al*., 1975). The behaviour of the collaboration was also observed, for which the collaborative level was used (due to the relationship between the total number of authors or countries and the total number of publications) (Bornmann, 2016) and the rate international collaboration (percentage of publications signed by two or more countries) (Gal et la., 2017) to calculate the depth of collaboration and the breadth of the contribution, respectively. Pearson's correlation was used to measure the correlation between the number of cases and deaths and the countries with the highest volume of publications. The structure of the international collaboration social network is shown through the following indicators: network density, degree of centrality (Out Degree) and standardized degree of centrality (nOut Degree), degree of closeness centrality (OutCloseness) and degree of centrality intermediation (Betweenness) and its normalized value (nBetweenness). The value of the network density determines its dispersion. A value of zero indicates a dispersed network, while the closer to 1 the network will be strongly connected (Petrescu-Prahova *et al*., 2015) Out Degree refers to the number of links in a country on the network, where the greater the connection, the more important and prestigious the network is node within the network (Han *et al*., 2014). Betweenness refers to the number of shortest paths that pass-through a given country. The greater the Betweenness, the greater the ability to control the information and the flow of the information transmitted between the other nodes (Salamati by and Soheili, 2016). OutCloseness measures the distance between nodes in the network, in which, the closer it is, the greater the capacity of a country to interact with others countries (Lang *et al*., 2013). The analysis of the journals consisted of identifying those specialized in the field of study. For this, the Bradforf dispersion was applied plus the Egghe formulation (Egghe, 1990):

$k = (e\gamma \times Ym)\ 1 / P\ r0 = T\ (k - 1) / (kp - 1)$ where $e\gamma = 1{,}781$, Ym is the number of articles in the most productive magazine, P corresponds to the number of areas, T is the total number of journals, r0 is the number of journals in the nucleus and k is the Bradford multiplier (Egghe, 1990). Finally, the publication languages were identified.

The records were initially exported to Refworks and later to Microsoft Excel. The network analysis was carried out with the UCINET.6 program (Lang, 2013) and VOSviewer (Visualization of Similarities Viewer) (Wang, 2018). The latter analyses of the data through the size of nodes (volume of articles), the thickness of the links that the connects (relationship intensity) and colour (collaboration cluster).

Ethical considerations

This study did not require being submitted to any bioethics committee.

RESULTS

Scientific production, growth rate and trend

2,748 records were published in 819 journals. 99.23% of the documents were published in the first three months of 2020 and 0.76%. In four months, there was an exponential growth in production (R2 = 0.99) (Fig. 1).

PubMed is the database that indexed the highest volume of records (86.53%), followed by Scopus (37.74%), WOS (11.09%), DOAJ (5.54%) and Cochrane (0, 52%). Eleven clinical trials have been registered in the Cochrane database.
The indexed documentary typology on COVID-19 found was: journal articles (73.36%), letters (15.35%), editorials (8.91%), reviews (5.27%), summaries (5, 13%), comments (2%), news (1.12%), registration of clinical trials (0.40%), guides (0.14%), brochures for patient education, book chapter and validation of studies (0.03%).

The most frequently used keywords, more than 100 times, were: covid-19 (494), humans (459), coronavirus infections (445), pneumonia (399), coronavirus (291), sars.cov-2 (253), disease outbreaks (143) and pandemics (101) (Fig. 2).

Authorship and collaboration

The production is signed by 10,109 authors affiliated with 6,371 institutions. 0.20% are large producers, 16.33% medium producers and 83.47% small producers. The authors with 10 or more publications are: E. Mahase of the British Medical Journal of the United Kingdom and L. Yang of Huazhong University of Science and Technology and Hubei Province Key Laboratory of Molecular Imaging of China, both with 21 documents; ZA. Memish from Alfaisal University in Saudi Arabia and Emory University in the United States (n = 16); H. Nishiura from Hokkaido University of Japan and A. Rimmer from the British Medical Journal (n = 13); W. Zhang of Hospital of Zunyi Medical University and Y. Zhang of Zhongshan Hospital and Fudan University of China and V. Wiwanitkit of Patil University of India (n = 12); AJ. Rodríguez-Morales of the Technological University of Pereira and the Autonomous University Foundation of the Americas of Colombia and S. Jiang of the Fundan University of China (n = 11); A. Akhmetzhanov from Hokkaido University in Japan, D. He from Lanzhou University in China, G. Iacobucci from the British Medical Journal, NM. Linton from Hokkaido University in Japan and D. Raoult from the Institut Hospitalo-Universitaire Méditerranée Infection in France (n = 10).

Institutions with more than 15 publications are: The British Medical Journal (n = 64), Chinese University of Hong Kong (n = 41), Emory University (n = 26), Hong Kong Polytechnic University (n = 20), Hainan Medical University and Patil University (n = 17), London School of Hygiene and Tropical Medicine (n = 16) and Hokkaido University (n = 15).

Geographic coverage

Scientific production comes from 82 countries (Table 1). The five countries with the highest production were China (53.31%), the United States (21.43%), Italy (11.75%), the United Kingdom (11.20%) and Canada (4.99%) (Fig. 3).
The Pearson correlation between countries with the highest number of cases and the number of deaths, and countries with the highest volume of publications was 0.57 and 0.39, respectively.

International Collaboration Social Network

78.96% of the articles presented co-authorship on average 6.73, DS 6.25 [2-65] and 11.86% an international collaboration rate on average 2.85 SD 1.74 [2-12]. The density of the international collaboration network shows a network's dispersion, since its value was 0.39 SD 1.52.

The countries with more than 100 links with other countries were: United States (279), China (153), Italy (146), United Kingdom (143) and Germany (119). While the countries with the highest Betweenness were the United States (1,126.69), the United Kingdom (570.15), Saudi Arabia (554.08), Germany (419.51) and Australia (373.65) (Fig. 4). Most of the countries publish in collaboration, except Hungary, presented a similar OutCloseness, so that all have similar possibilities to access collaborations with other countries (Table 1).

Specialized journals in the field

The production is published in 820 international magazines. The journals, considered specialized for being located in the nucleus, after having applied the Bradforf and Egghe formula seen in the Method section, are: British Medical Journal (216 articles; 5.38% of the production), New England Journal of Medicine (57; 2.07), Nature (52; 1.89), JAMA (50; 1.81%), Emerging Infectious Diseases (49; 1.78%), Lancet Infectious Diseases (47; 1.71%), Clinical Infectious Diseases (43; 1.56%) and Zhonghua Jie He Hu Xi Za Zhi (39; 1.41%).

Publication languages

The production is published in nine languages: English (91.30%), Chinese (6.95%), Spanish (0.76%), Portuguese (0.54%), German (0.18%), French (0.14%), Icelandic, Italian and Norwegian (0.03%).

Table 1 Relationship between the number of cases and deaths from COVID-19 (April 29, 2020) (WHO, 2020) and production volume and collaboration parameters

Country	Total cases confirmed	Total deaths	Nº articles (%)	OutDegree (nOutDegreee)	Betweenness (n Betweenness)	OutCloseness
China	84369	4643	1465 (53.31)	153 (4.73)	330.81 (5.65)	39.69
United States of America	983457	50492	589 (21.43)	279 (8.26)	1126.69 (19.25)	43.5
Italy	201505	27359	323 (11.75)	146 (4.51)	327.22 (5.59)	39.78
United Kingdom	161149	21678	312 (11.20)	143 (4.42)	570.15 (9.74)	40.95
Canada	49014	2766	139 (4.99)	83 (2.56)	58.81 (1.39)	37.74
Australia	6738	88	122 (4.43)	86 (2.65)	373.65 (6.38)	38.5
Singapore	15222	14	85 (3.09)	41 (1.26)	194.91 (3.33)	35.98
Germany	157641	2115	73 (2.65)	119 (3.68)	419.51 (7.16)	40.95
France	125454	23627	66 (2.40)	87 (2.69)	140.36 (2.39)	37.19
India	31332	1007	63 (2.29)	38 (1.17)	82.53 (1.41)	36.66
Switzerland	29181	1379	61 (2.19)	83 (2.56)	104.93 (1.99)	38.5
Korea	10761	246	58 (2.08)	22 (0.68)	13.45 (0.23)	35.81
Brazil	66501	4543	50 (1.81)	46 (1.42)	167.46 (2.82)	36.49
Japan	13852	389	47 (1.71)	29 (0.0.89)	33.64 (0.57)	35.32
Iran	92584	5877	44 (1.60)	49 (1.51)	124.89 (2.13)	38.11
Spain	210773	23822	44 (1.60)	75 (2.31)	68.89 (1.19)	35.78
Saudi Arabia	20077	152	41 (1.49)	75 (2.31)	554.08 (9.46)	39.08
Sweden	19621	2355	27 (0.98)	30 (0.92)	146.59 (2.2	36.32
Thailand	2947	54	26 (0.94)	17 (0.52)	3.23 (0.05)	34.52
Netherlands	38416	4566	22 (0.8)	40 (1.23)	42.98 (0.76)	35.81
Belgium	47334	7331	17 (0.61)	29 (0.92)	26.99 (0.46)	34.37
Colombia	5597	253	16 (0.58)	53 (1.63)	149.78 (2.55)	37.09
Poland	12218	596	14 (0.50)	10 (0.3)	0	33.33
Argentina	4019	197	13 (0.47)	32 (1.08)	163.61 (2.79)	37.19
Greece	2534	136	13 (0.47)	13 (0.4)	0.06 (0.001)	32.9
South Africa	4996	93	13 (0.47)	29 (0.89)	24.38 (0.41)	35.96
Denmark	8851	434	12 (0.43)	37 (1.14)	28.25 (0.48)	36.66
Egypt	5042	359	11 (0.40)	25 (0.77)	24.18 (0.41)	35.32
Norway	7605	195	11 (0.40)	5 (0.15)	0	32.48
Portugal	24322	948	11 (0.40)	15 (0.46)	1.26 (0.02)	32.76
Pakistan	14885	327	10 (0.36)	16 (0.49)	130.53 (2.23)	34.68
Peru	28699	782	10 (0.36)	23 (0.78)	61.25 (1.04)	35
Austria	15314	569	9 (0.32)	11 (0.34)	3.72 (0.06)	32.21
Nepal	54	0	9 (0.32)	25 (0.85)	14.43 (0.24)	35.32
Russia	99399	972	9 (0.32)	18 (0.55)	11.25 (0.19)	34.01
Mexico	15529	1434	8 (0.29)	14 (0.47)	13.18 (0.22)	32.796
Israel	15782	212	7 (0.25)	8 (0.24)	0.63 (0.011)	32.9
Bangladesh	6462	155	6 (0.21)	8 (0.27)	1.26 (0.02)	31.81
Malaysia	5851	100	6 (0.21)	17 (0582)	57.70 (0.98)	34.68
Vietnam	270	0	6 (0.21)	13 (0.44)	8.36 (0.14)	33.77
Chile	14365	207	5 (0.18)	22 (0.73)	81.6 (1.39)	35.26
Mali	424	24	5 (0.18)	8 (0.27)	0	32.15
Oman	2274	10	5 (0.18)	12 (0.41)	0.35 (0.006)	33.91
Venezuela	329	10	5 (0.18)	21 (0.71)	22.38 (0.38)	33.92
Finland	4740	199	4 (0.14)	8 (0.24)	0	31.55
Ireland	19877	1159	4 (0.14)	3 (0.93)	0	30.8
Romania	11616	650	4 (0.14)	8 (0.24)	3.14 (0.05)	32.76
Turkey	114564	2992	4 (0.14)	6 (0.2)	0	31.42
United Arab Emirates	11380	89	4 (0.14)	10 (0.31)	0	33.77
Croatia	2047	63	3 (0.10)	7 (0.21)	0.46 (0.008)	33.62
Ethiopia	126	3	3 (0.10)	6 (0.2)	0	31.04
Ghana	1671	16	3 (0.10)	4 (0.13)	0	28.3
Hungary	2727	300	3 (0.10)	0	0	1.28
Indonesia	5136	469	3 (0.10)	1 (0.03)	0	28.62
Jordan	449	8	3 (0.10)	9 (0.27)	27.22 (0.46)	29.5
New Zealand	1084	9	3 (0.10)	1 (0.03)	0	28
Panama	6021	167	3 (0.10)	11 (0.37)	0.07 (0.001)	30.31
Afghanistan	1827	60	2 (0.07)	12 (0.37)	42.28 (0.72)	32.48
Brunei	138	1	2 (0.07)	2 (0.06)	0	26.64
Congo	491	30	2 (0.07)	13 (0.40)	23.32 (0.39)	33.48
Cyprus	837	20	2 (0.07)	0	0	0
Honduras	702	64	2 (0.07)	21 (0.64)	66.36 (1.13)	36.32
Island	1795	10	2 (0.07)	12 (0.37)	0.15 (0.003)	33.47
Nigeria	1337	40	2 (0.07)	15 (0.51)	38.91 (0.66)	34.82
Slovenia	1408	86	2 (0.07)	2 (0.06)	0	30.67
Sudan	318	25	2 (0.07)	7 (0.21)	0	29.27
Tanzania	300	10	2 (0.07)	6 (0.2)	0	30.04
Bolivia	1014	53	1 (0.03)	11 (0.37)	0.07 (0.001)	29.67
Côte d'Ivore	1183	14	1 (0.03)	4 (0.12)	0.33 (0.006)	32.35
Iraq	1928	90	1 (0.03)	7 (0.24)	0	29.27
Morocco	4252	165	1 (0.03)	7 (0.24)	0	29.27
Myanmar	150	5	1 (0.03)	0	0	0
Palestine	343	2	1 (0.03)	0	0	0
Paraguay	230	9	1 (0.03)	11 (0.37)	0.07 (0.001)	30.31
Qatar	11921	10	1	0	0	0
Senegal	823	9	1 (0.03)	3 (0.1)	0	31.68
Sri Lanka	619	7	1 (0.03)	7 (0.21)	0.14 (0.002)	33.33
Uganda	79	0	1 (0.03)	0	0	0
Ukraine	9866	250	1 (0.03)	1 (0.03)	0	30.55
Uruguay	620	15	1 (0.03)	12 (0.41)	6.2 (0.1)	31.04
Yemen	1	0	1 (0.03)	7 (0.21)	0	29.2
Zambia	95	3	1 (0.03)	6 (0.2)	0	31.04

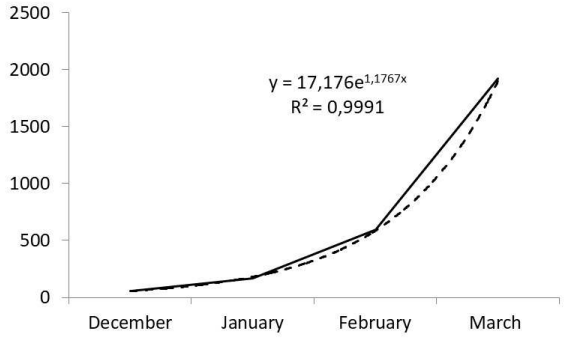

Fig 1 Growth of scientific production in COVID-19

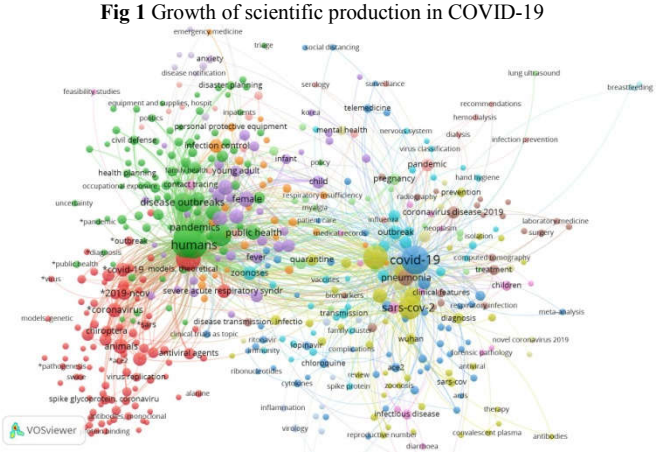

Fig 2 Relationship map of the keywords.

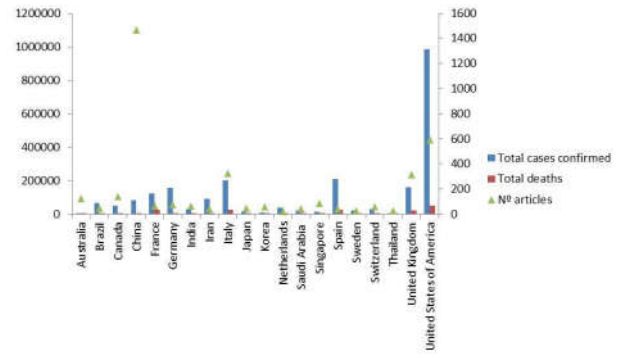

Fig 3 Relationship map of the keywords

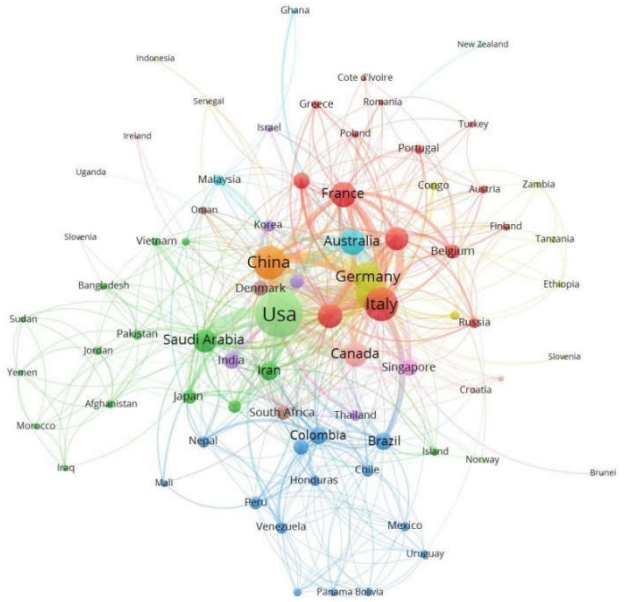

Fig 4 International collaboration network of the countries with investigations in COVID-19

DISCUSSION

In the last five months, medical and scientific institutions, as well as governments, have put their full attention on COVID-19. This fact has generated a large amount of scientific information on this disease, showing in just four months an exponential growth in the scientific literature on SARS-CoV-2. This situation is even more relevant considering that healthcare institutions have had to put all their efforts into the medical care of affected patients (Brown by Horton, 2020). This growth is expected to continue over time until the results of observational and experimental studies be more consistent. On the other hand, it is worth noting the presence of authors with more than 10 works in such a short period of time, something unusual.

Almost "all the works are observational studies, but it is"…. expected that, in a short period of time, there will be an increase in publications based on experimental studies since, for example, Cochrane has already registered 11 clinical trials. Although clinical trials will provide the most effective and safe treatment, as well as the possibility of developing a vaccine against SARS-CoV-2, observational and intervention studies are required as a starting point to find alternative solutions. for the prevention, treatment and control of the disease (Chahrour *et al*., 2020).

The correlation between countries with a higher number of confirmed cases and the number of deaths from COVID-19 and countries with a higher volume of work is weak. Until mid-April, the most affected countries, according to the number of confirmed cases, are the United States, Spain, Italy, Germany, France, the United Kingdom and China. Spain, second country with the highest number of cases so far and third in deaths from COVID-19, occupies the sixteenth position for the volume of its scientific production. Possibly this fact is due to the overload of health services due to the rapid spread of COVID-19 in the territory (Chahrour *et al*., 2020). The rest of the countries most affected by the pandemic occupy relevant positions in terms of the number of publications, collaborations and even they present positions of interest to manage work groups. At the opposite pole are countries with fewer jobs, low- and middle-income countries, with little access to health services and, therefore, are more vulnerable to the pandemic (Nasab by Rahim, 2020).

Although scientific research becomes more relevant when carried out in international collaboration, in the case of COVID-19 it is essential to establish collaboration networks in order to better understand the pandemic. It is desirable that countries coordinate efforts to control the disease and, not as it has been done so far, that the main containment measures established in many countries have been unilateral. However, so far, the work in international collaboration does not reach 15%, with a widely dispersed collaboration network. The collaborative trend is to research together with countries with geographical proximity and similar socioeconomic and health characteristics. However, at this time the collaboration network should be established at a more global level.

Future research should focus on disadvantaged countries in Asia, Africa, and Latin America and the Caribbean, because if the epidemic has the impact observed in Europe in low- and middle-income countries, it could be devastating, with serious socio-economic and social consequences. health for affected countries. The few available health resources, together with a population with a higher number of risk factors and high mortality from pneumonia and tuberculosis, for example, could lead to a high number of cases of COVID-19 (Martínez-Álvarez , *et al*., 2020) and an increase in the death rate from such infection (Ataguba *et al*, 2020).

The importance of establishing collaborations with low-income countries lies precisely in the fact that the political, ethnic and social plurality, together with fragile health systems and the presence of important population centres in which social isolation is more difficult, due to that they work in the informal sector or, in precarious conditions of income and social security, lead to it being a sensitive area for the spread of COVID-19 (Rodríguez-Morales *et al*., 2020).

China and Italy, despite occupying the first position in terms of the volume of their work and the second in number of collaborations, do not have the capacity to manage work groups, according to the data of this study. However, Saudi Arabia and Germany, having a lesser track record of publishing on COVID-19, their online position gives them greater ability to lead working groups. Most of the countries that publish in collaboration, except Hungary, have a similar centrality, so that all have similar possibilities to access collaborations with other countries. Although, it is the countries with the highest number of incomes, such as the

United States of America, the United Kingdom and Germany, that have a privileged position in the network and will play an important role in future collaborations due to their greater accessibility to other countries.

The authors choose English journals to publish in. English journals as is usual in scientific literature, in order to obtain a greater and faster dissemination of their results.

Limitations

The data collected varies from day to day, so establishing a solid bibliometric framework currently presents some difficulty. However, the findings presented give an idea of the trend regarding the publication of works on this disease.

CONCLUSIONS

Publications on COVID-19 will increase in a short period of time, with studies with higher level of scientific evidence. However, it is necessary to increase the research production of all the countries affected by the disease, preferably in international collaboration, in order to establish health policies worldwide, considering the socioeconomic and political determinants of each country. Countries with higher resources should promote more research with low-middle income countries.

References

1. Organización Mundial de la Salud (OMS). Brote de enfermedad por coronavirus (COVID-19). (Consultado 2 Abr 2020). Disponible en: https://www.who.int/westernpacific/emergencies/covid-19.
2. Lai, C.C., Shih T.P., Ko, W.C., Tang, H.J. and Hsueh, P.R. 2020. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and coronavirus disease-2019 (COVID-19): The epidemic and the challenges. Int J Antimicrob Agents, 55(3):105924. doi: 10.1016/j.ijantimicag.2020.105924.
3. Gorbalenya, A.E., Baker, S.C., Baric, R.S., de Groot, R.J., Drosten, C., Gulyaeva, A.A., *et al*. 2020. Severe acute respiratory syndrome-related coronavirus: The species and its viruses - a statement of the Coronavirus Study Group. bioRxiv. doi: 10.1101/2020.02.07.937862.
4. Russell, T.W., Hellewell, J., Jarvis, C.I., van Zandvoort, K., Abbott, S., Ratnayake, R. *et al*. 2020. Estimating the infection and case fatality ratio for coronavirus disease (COVID-19) using age-adjusted data from the outbreak on the Diamond Princess cruise ship, February 2020. Euro Surveill., 5(12): 2000256. doi: 10.2807/1560-7917.ES.2020.25.12.2000256.
5. Kenji, M., Katsushi, K., Alexander, Z. and Gerardo, C. 2020. Estimating the asymptomatic proportion of coronavirus disease 2019 (COVID-19) cases on board the Diamond Princess cruise ship, Yokohama, Japan, 2020. Euro Surveill., 25(10): 2000180. doi: 10.2807/1560-7917.ES.2020.25.10.2000180.
6. World Health Organization (WHO). Coronavirus disease 2019 (COVID-19) Situation Report – 100. (Consultado 29 Abr 2020). Disponible en: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200429-sitrep-100-covid-19.pdf?sfvrsn=bbfbf3d1_2
7. Nasab, F.R. and Rahim, F. 2020. Bibliometric Analysis of Global Scientific Research on SARSCoV-2 (COVID-19). medRxiv. doi: 2020.03.19.20038752
8. Chahrour, M., Assi, S., Bejjani, M., Nasrallah, A.A., Salhab, H., Fares, M. *et al*. 2020. A Bibliometric Analysis of COVID-19 Research Activity: A Call for Increased Output. Cureus, 12(3): e7357. doi:10.7759/cureus.7357.
9. Lou, J., Tian, S.J., Niu, S.M., Kang, X.Q., Lian, H.X., Zhang, L.X., *et al*. 2020. Coronavirus disease 2019: a bibliometric analysis and review. Eur Rev Med Pharmacol Sci, 24: 3411-3421.
10. Price, D.S., Gürsey, S. Studies in Scientometrics I. 1975. Transience and Continuance in Scientific Authorship. Ci. Inf. Rio de Janeiro., 4(1): 27-40.
11. Bornmann, L. 2016. Is collaboration among scientists related to the citation impact of papers because their quality increases with collaboration? An analysis based on data from F1000Prime and normalized citation scores. J Am Soc Inf Sci Tec., 68: 1036-047.doi: 10.1002/asi.23728.
12. Gal, D., Glanzel, W. and Sipido, K.R. 2017. Mapping cross-border collaboration and communication in cardiovascular research from 1992 to 2012. Eur Heart J., 38: 1249-258. doi: 10.1093/eurheartj/ehw459.
13. Petrescu-Prahova, M., Belza, B., Leith, K., Allen, P., Coe, N.B. and Anderson, L.A. 2015. Using Social Network Analysis to Assess Mentorship and Collaboration in a Public Health Network. Prev Chronic Dis., 2: e130. doi: 10.5888/pcd12.150103.
14. Han, P., Shi, J., Li, X., Wang, D., Shen, S. and Su, X. 2014. International collaboration in LIS: global trends and networks at the country and institution level. Scientometrics; 98(1): 53-72.
15. Salamati, P. and Soheili, F. 2016. Social network analysis of Iranian researchers in the field of violence. Chin J Traumatol., 19(5): 264-270.
16. Lang, P.B, Gouveia, F.C. and Leta, J. 2013.Cooperation in health: mapping collaborative networks on the web. PLoS One., 8(8): e71415. doi:10.1371/journal.pone.0071415.
17. Egghe, L. 1990. Applications of the theory of Bradford's Law to the calculation of Leimkuhler's Law and to the completion of bibliographies. J Assoc Inf Sci., 41(7): 469-92.
18. Lang, P.B., Gouveia, F.C. and Leta, J. 2013. Cooperation in health: mapping collaborative networks on the web. PLoS One., 8(8): e71415. doi:10.1371/journal.pone.0071415.
19. Wang, Y., Zheng, J., Zhang, A., Zhou, W. and Dong, H. 2018. Visualization maps for the evolution of research hotspots in the field of regional health information networks. Inform Health Soc Care., 43(2): 186-206. doi: 10.1080/17538157.2017.1297304.
20. Brown, A and Horton, B. 2020. A planetary health perspective on COVID-19: a call for papers. Lancet Planet Health. doi: 10.1016/S2542-5196(20)30078-4.
21. Martínez-Álvarez, M., Jarde, A., Usuf, E., Brotherton, H., Bittaye, M., Samateh, A.L., *et al*. 2020. COVID-19 pandemic in west Africa. Lancet Glob Health, 29: 101613. doi: 10.1016/j.tmaid.2020.101613.
22. Ataguba, J.E. 2020. COVID-19 Pandemic, a War to be Won: Understanding its Economic Implications for Africa. Appl Health Econ Health Policy. doi: 10.1007/s40258-020-00580-x.
23. Rodríguez-Morales, A.J, Gallego. V., Escalera-Antezana, J.P., Méndez, C.A., Zambrano, L.I., Franco-Paredes, C., *et al*. 2020. COVID-19 in Latin America: The implications of the first confirmed case in Brazil. Travel Med Infect Dis., 29: 101613. doi: 10.1016/j.tmaid.2020.101613.

*****