COVID-19 PANDEMIC DISEASE: A Bibliometric Study

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Abstract:

Novel Coronavirus pandemic disease is spreading very fast worldwide. More than 200 countries are affected due to the deadly virus. An attempt has been made to study the bibliometric study on COVID-19 and analysed the data and presented tabular and graphical form. Published bibliographic data were collected from 2001 to 2020 from Scopus citation databases. This present study evaluated the contemporary scientific literature to assess the literature available on COVID-19, and identify the leading research patrons and explore the same. This study provided a global bibliometric evaluation of COVID-19 studies, which may facilitate ongoing and future research.

Background: Novel coronavirus disease (COVID-19) was initially detected in China a short time ago, and ultimately developed a most important global health nervousness due to its nature and extensive spreading everywhere in this world. Despite a rising awareness in COVID-19 among the people, little is understood about the present state of data on COVID-19, which may describe what proportion is understood about this difficulty. This bibliometric analysis assessed the present-day scientific information to measure the growth of literature available on COVID-19, recognise the leading research stakeholders, and explore the same.

Methods: Bibliometric records on Coronavirus Disease – 19 reported studies published till April 1, 2020, were recovered from the leading database such as SCOPUS. Further, collected suitable data were analysed with the help of MS-Excel.

Results: A total of 541 publications and 11251citations were taken for this study, comprising of journal articles, reviews, letters, and other publications. The average number of authors and

citations per document was 2.45 and 70.76 correspondingly. Also, the best ten articles, authors, and journals were recognised built on the occurrence of publications. It is identified that, Medicine, Immunology and Microbiology and other pandemic related topics are associated with COVID - 19 are the major area of study during the study period. Highest publications have appeared in PLOS One journal. Highest publications emerged from USA.

Keywords: Novel Coronavirus, COVID-19, Coronavirus; Communicable diseases, Bibliometric study

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1. Introduction and Need for the Study

The present COVID-19 epidemic is unique, but the worldwide reaction draws on the experience learned from other viruses out breaks over the preceding several eras (WHO). The coronavirus which was known as SARS-CoV-2 and caused a serious respiratory disease, named as COVID-19 infection[1, 2,] had been infected by more than 3,309,107 people, 2, 34,143 dead, every day around 5000 cases are detected and being spread in 212 countries and territories around the world by May 01, 2020[3]. From January to May 1, 2020 totally 44, 24,135 people died due to communicable diseases deaths in this world. The continuing outbreak of COVID-19 had raised serious concerns of more and more researchers. At least 55 papers written in the English language on COVID-19 had been published in the journals in the year 2020 till April 30.

Coronaviruses are RNA viruses widely found among many mammal species, including human beings.[4] Although these viruses generally have low virulance, two epidemics by acute respiratory pattern coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV) are considered as major community health events in the prior two decades. The case fatality tolls were 10% and 37% for SARS-CoV and MERS-CoV[8] respectively. In December 2019, a novel coronavirus emerged in Wuhan City, Hubei Province of China.[8] This outbreak was unique in terms of high pathogenicity and mortality compared to the earlier epidemics by coronaviruses.[14] On 31st December 2019, WHO was apprised of cases of pneumonia of unknown cause in Wuhan City, China. A novel coronavirus was detected as the cause by Chinese authorities on 7th January 2020. Sooner cases affected by novel coronavirus were found outside Wuhan and eventually throughout the world. On January 30, 2020, the World Health Organization announced the epidemic a public health emergency of international concern.[6]Later, WHO named the disease by novel coronavirus as "COVID-19", which is a short form of "Coronavirus Disease 2019" on February 11, 2020. With a growing number of new cases and increased mortality attributable to COVID-19 pandemic[11], global health discourses among the scientific community, policymakers, and the general population are emphasizing on what is known about this virus. Although it is known that COVID-19 remains uniquely different than SARS-CoV and MERS-CoV, the scientific knowledge on COVID-19 remains limited within the scope of recently published articles. It is essential to understand the growth of emerging scientific data on COVID-19 to inform further investigation as well as evidence-based policymaking.

The public health emergency like the COVID-19 pandemic may affect different frontiers of human lives globally. To solve such problems, it is necessary to fully understand the problem and solutions that may address the same. This need for knowledge is a fundamental force that keeps science alive and allows scientists to thrive in their research domains bringing the best possible methods and materials to answer real-life questions. Solving a complex public health problem like COVID-19 needs robust knowledge generated through rigorous methods specific to each problem related to different dimensions of COVID-19 as well as the lives of millions of people around the world.

2. Review of Literature

LOU, J and others (2020) analysed the publications about "COVID-19 to summarize the research hotspots and make a review, to provide a reference for researchers in the world. They searched in PubMed using the keywords "COVID-19" from inception to March 1, 2020. Retrieved data included title, corresponding author, language, publication time, publication type, research focus. The analysis found that 183 publications published from 2020 January 14 to 2020 February 29 were included in the study. The first corresponding authors of the publications were from 20 different countries. Among them, 78 (42.6%) from the hospital, 64 (35%) from the university and 39 (21.3%) from the research institution. All the publications were published in 80 different journals. Journal of Medical Virology published most of them (n=25). 60 (32.8%) were original research, 29 (15.8%) were review, 20 (10.9%) were short communications. 68 (37.2%) epidemiology, 49 (26.8%) virology and 26 (14.2%) clinical features. According to them, China has provided a large number of research data for various research fields, during the outbreak of COVID-19. Most of the findings play an important role in preventing and controlling the epidemic around the world".[2]

Singh, Nirmal and others (2019) studied "Scientometric study and network visualization of journal articles on Nipah virus for a better understanding of research trends on the subject. Metadata of journal articles were retrieved from Scopus database in 2018. After removing unwanted and inadequate records. 1007 documents were analysed the publishing tendencies on Nipah Virus. The outcome of the study disclosed the inconsistent growth of publications on the subject. There were only some prolific authors with less than 15 articles. The USA led the world in terms of the highest contribution to the number of articles. A great degree of the inter-country and inter-continent partnership was found among the US, Australia, Malaysia, United

Kingdom and Bangladesh portraying that the developed world is working in alliance with the developing nations to challenge the crisis".[5]

Wen-Ta Chiu, Jing-Shan Huang, Yuh-Shan Ho (2004) identified that "Severe Acute Respiratory Syndrome (SARS) has to turn out to be the major of health issues since its outbreak early 2003. The paper aims to perform a bibliometric analysis of all SARS-related publications available in the Science Citation Index (SCI) in the primary stage. An efficient examination was conducted by using the SCI for publications ever since the SARS outbreak early 2003. Chosen papers comprised of severe acute respiratory syndrome or SARS as a part of its title, abstract, or keyword from the initial phase of SARS outbreak, from March to till July 8, 2003. They contained limitations such as authorship, patterns of international collaboration, journals, language, and reprint address for study purpose. Citation analysis was based on the impact factor as defined by Journal Citation Reports (JCR) issued in 2002 and on the actual citation impact (ACI). Further researchers discovered that Thirty-two percent of the total share was published as news features, 25% as editorial materials, 22% as articles, 13% as letters, and the remaining being biographic items, corrections, meeting abstracts, and reprints. The US dominated the production by 30% of the total share followed diligently by Hong Kong with 24%. Sixty-three percent of publication was published by the majority of countries. The SARS publication pattern in the past few months suggests immediate citation, low collaboration rate, and English and mainstream country domination in production. We observed no associations of research indexes with the number of cases".[5]

3. **Objectives:**

3.1 To analyse retrospectively the available publications on Coronavirus Disease - 19

3.2 To know the productive authors in the area of research

3.3 To classify subject-wise and document wise publications in this field

3.4 To suggest which organisations are at the forefront of the research

3.5 To provide references for researchers in the world.

4. **Scope and Methodology**

We have undertaken this study to know who is studying on coronavirus, from which place, what is their affiliation, in which journal they published their articles, we have logged in to Scopus database to find out how many articles are published and how many citations are received by these publications. The above-mentioned researchers searched the Scopus database

using the following keyword "Coronavirus Disease 2019", and accessed twenty years data from 2001 to 2020. After retrieving the data, only suitable data on Coronavirus Diseases 2019 were extracted in Microsoft Excel format. Data were extracted directly from the database, regarding publications, title, corresponding author, author affiliation, author nationality, language, publication type etc. Studies revealed that very few bibliometric analysis has taken place on coronavirus literature.

5. Analysis and Interpretation of Data

Table No. 1
Year wise Distribution of Publications and Citations

| Year	No. of Publications	No. of Citations	Citations per Publication
2020	55 (10.16)	28 (0.24)	0.50
2019	38 (7.02)	41 (0.36)	1.07
2018	34 (6.28)	145 (1.28)	4.26
2017	36 (6.65)	209 (1.85)	5.80
2016	36 (6.65)	256 (2.27)	7.11
2013	33 (6.09)	371 (3.29)	11.24
2015	29 (5.36)	381 (3.38)	13.13
2014	25 (4.62)	337 (2.99)	13.48
2003	25 (4.62)	395 (3.51)	15.8
2011	25 (4.62)	556 (4.94)	22.24
2010	24 (4.43)	593 (5.27)	24.70
2004	21 (3.88)	551 (4.89)	26.23
2012	22 (4.06)	611 (5.43)	27.77
2001	13 (2.40)	368 (3.27)	28.30
2008	14 (2.58)	418 (3.71)	29.85
2005	32 (5.91)	1140 (10.13)	35.62
2007	23 (4.25)	943 (8.38)	41
2009	24 (4.43)	1023 (9.09)	42.62
2002	12 (2.21)	815 (7.24)	67.91
2006	20 (3.69)	2070 (18.39)	103.5

Figure No.1
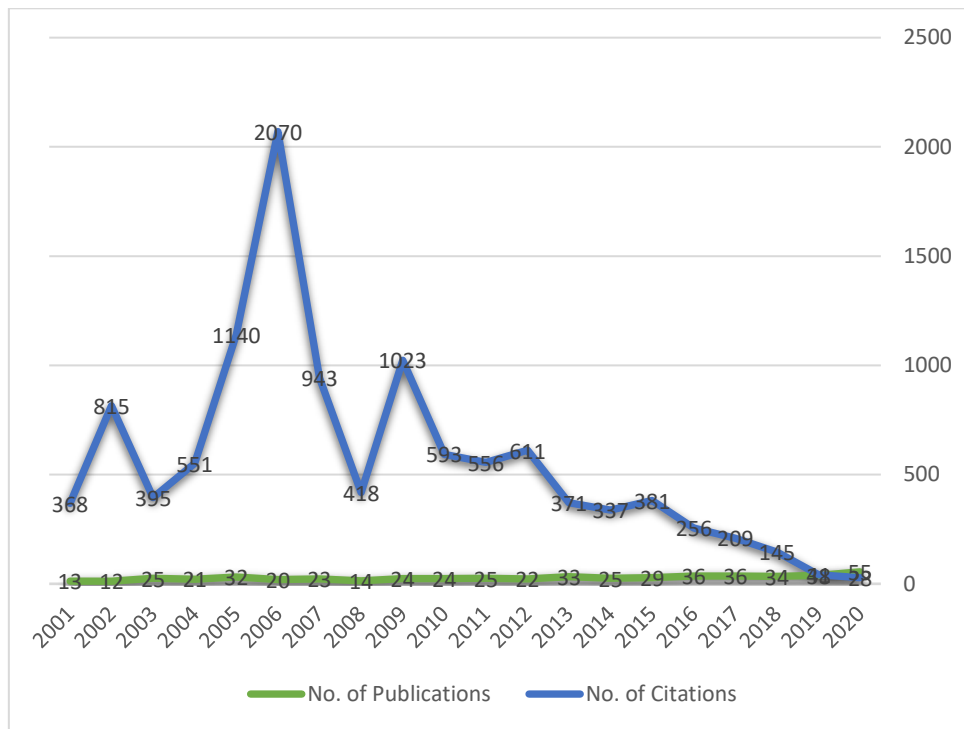
Table and Figure 1 analyses the publications published and citations received on the topic of Coronavirus Diseases - 19 published in different journals indexed in the Scopus database for a time frame of 20 years starting from 2001 to 2020. This duration resulted in the publication of 541 publications. This analysis showed that the most number of publications were published in the year 2020 with 55 (10.16%) publications and followed by 2019 with 38 (7.02%), 2016 and 2017 with 36 (6.65%) publications each being published and ranked 1st, 2nd and 3rd place during the study.

The growth of publications on Coronavirus during the period under the study was found to be uneven but slightly in increasing mode. In the first 10 years (2001-2010) publications on Coronavirus is very less 38% (208) only, whereas later half from the year 2011-2020 publications are raised to 62% (333). Publications are increased in the later year 2019 and 2020 due to the spread of the Coronavirus all over the world.

Topmost citations are found in the year 2006 with 2070 citations followed by 1140 and 1023 in the year 2005 and 2009 respectively. Least citations are received in the year 2020 with 28. On an average 562 citations are received in this twenty years of study. More than average citations are received in the year 2002, 2005, 2006, 2007, 2009, 2010 and 2012. It is understood from the study that, articles required more number of years to cite in different publications. But

now in the year 2020, a lot of articles will get citations, since this coronavirus is spread all over the world.

Lowest citations per publications are in the year 2020 with 0.50, whereas the highest is in the year 2006 with 103.5. On an average 20.79 citations are received per publications throughout the reported period of twenty years.

Table No. 2

Relative Growth Rate and Doubling Time

Year	No. of Publications	Cumulative Publications	W1	W2	RGR	Mean of RGR	DT	Mean of DT
2001	13	13	-	2.564	-	1.636	-	2.360
2002	12	25	2.564	3.218	0.654		0.943	
2003	25	50	2.484	3.912	1.428		2.060	
2004	21	71	3.218	4.262	1.044		1.506	
2005	32	103	3.044	4.634	1.59		2.294	
2006	20	123	3.465	4.812	1.347		1.943	
2007	23	146	2.995	4.983	1.988		2.868	
2008	14	160	3.135	5.075	1.94		2.799	
2009	24	184	2.639	5.214	2.575		3.715	
2010	24	208	3.178	5.337	2.159		3.115	
2011	25	233	3.178	5.451	2.273		3.279	
2012	22	255	3.218	5.541	2.323		3.352	
2013	33	288	3.091	5.662	2.571		3.709	
2014	25	313	3.496	5.746	2.25		3.246	3.589
2015	29	342	3.218	5.834	2.616		3.774	
2016	36	378	3.367	5.934	2.567		3.704	
2017	36	414	3.583	6.025	2.442	2.487	3.523	
2018	34	448	3.583	6.104	2.521		3.637	
2019	38	486	3.526	6.186	2.66		3.838	
2020	55	541	3.637	6.293	2.656		3.832	

Figure No. 2
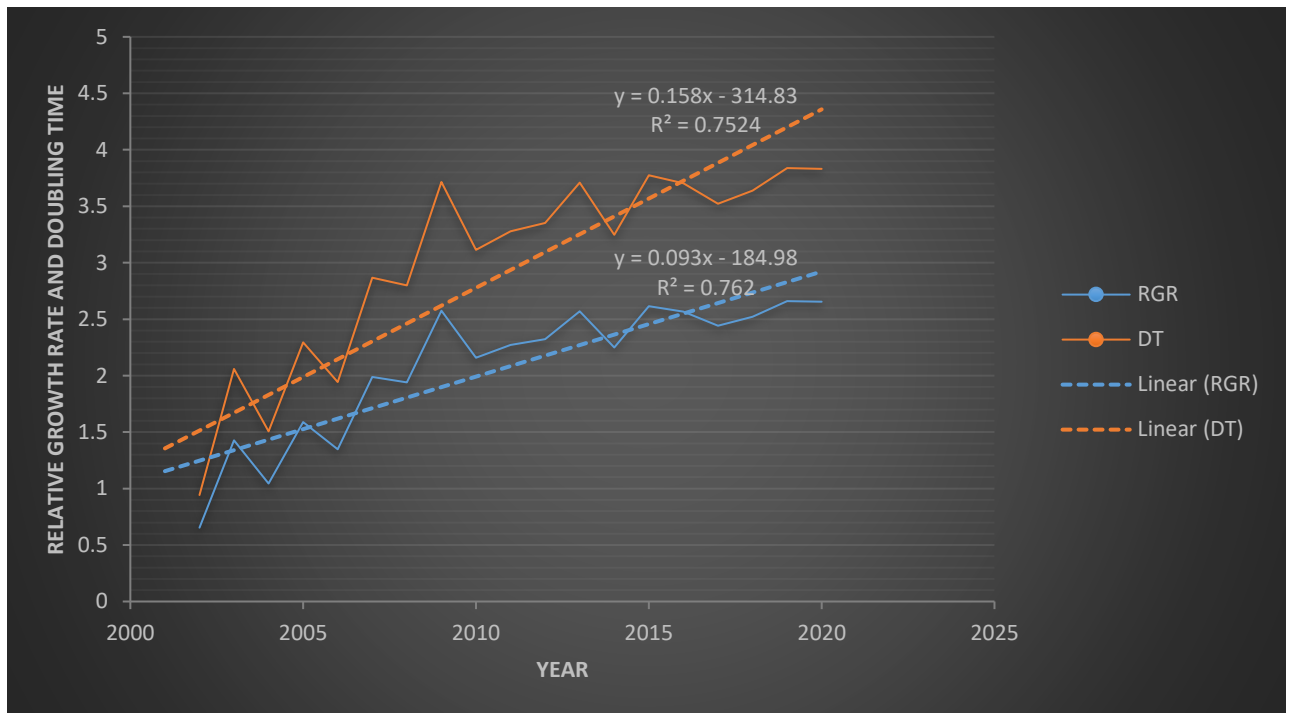
Relative Growth Rate (RGR) means the growth in a number of publications per unit of time which is shown in Table and Figure 2, out of the following calculation. The mean relative growth rate R (1-2) over a specific period of the interval can be calculated from the following equation[6].

R (1-2) =W2-W1/T2-T1

Where, R = Mean relative progress rate over the specific period of interval;

W1 = Natural record of preliminary number of publications

W2 = Natural record of last number of publications.

T2 – T1 = Unit variance between the initial time and final time.

Further table 2 indicates the RGR and DT of Coronavirus – 2019 publications output. The mean RGR has been increased from 1.636 in the first half to 2.487 in the second half,

whereas the mean doubling time is increased from 2.360 to 3.589 during the same period. The mean relative growth for the first five years (2001 to 2010) showed a growth rate of 1.636 whereas the mean relative growth for the last five year (2011 to 2020) increased to 2.487. The corresponding doubling time for different years gradually increased from 0.943 in 2002 to 3.832 in 2020. Doubling Time is reached to its peak in the year 2019 and lowest DT can be found in the year 2002. Thus the rate of growth of publication was increased correspondingly doubling time also increased. It is observed from the table and figure, there is a very less gap between the relative growth rate and doubling time in the initial years, as it is progressed year after year we can see a wide gap between the relative growth of publications and doubling time also.

Table No. 3

Author wise Distribution of Publications

Name of the Author's	No. of Publications	Rank
Akashi, M.	11 (2.82)	1
Hamada, K., Kaneko, T. (2x6=12)	12 (3.07)	2
Akagi, T., Chen, M.Q., De Groot, R.J., Drosten, C., Rottier, P.J.M. (5x5=25)	25 (6.41)	3
Alenius, S., Baba, M., Giuliano, A.R., Grünweller, A., Ziebuhr, J., (5x4=20)	20 (5.12)	4
Abrahamsen, M.,Basak, A.,Basak, S.,Biswas, P., De Clercq, E., Dunne, E.F., Emanuelson, U., Fischer, W.B., Flores, R., Goyal, S.M., Haagmans, B.L., Harris, R.B., Hildt, E., Huizinga, E.G., Koopmans, M., Langereis, M.A., Memish, Z.A., Morikawa, S., Müller, M.A., Nielson, C.M., Smits, S.L., Snijder, E.J., Spaan, W.J.M., Steinmetz, N.F., Yamamoto, N., Zeng, Q. (26x3=78)	78 (20)	5
Abdul-Careem, M.F., Aboul-Ela, F., Addie, D.D., Al-Tawfiq, J.A., Amiroch, S., Arabi, Y.M., Assiri, A., Baker, S.C., BaldelliBombelli, F., Balkhy, H., Balzarini, J., Bankiewicz, K.S., Barnard, D.L., Bayry, J., Berardi, A., Berry, S., Bhunia, A., Binger, T., Bossi, P., Bricaire, F., Bringas, J., Catroxo, M.H.B., Chen, H.W., Chen, P.J., Chen, Y.I., Choi, B.R., Choi, J.Y.,	240 (61.53)	6

Chrétien, M., Chuang, C.P.J., Chuang, C.Y., Cobigo, Y., Coenjaerts, F.E.J., Collisson, E.W., Cork, S.C., Corman, V.M., Crouch, C.F.,Crusio, K.M., Daszak, P., Decaro, N., Deka, D., Dhume, K., Drexler, J.F., Elgner, F., Fang, W., Fang, Z.S., Farag, E., Finn, C., Forsayeth, J., Francis, M.J., Ganguly, S., Geldenhuys, M., Ghosh, A., Glitscher, M., Gorbalenya, A.E., Granzow, H., Hadaczek, P., Hanes, J., Hartmann, R.K., Hashimoto, S., Hashimoto, Y., Hellmuth, J., Herrler, G., Hogan, C.J., Horzinek, M.C., Hsu, H.J., Hu, C.M.J., Huang, W., Huang, Y.C., Huo, Q., Ieki, R., Im, S.G., Isa Irawan, M., Ishida, I., Jang, B., Jeong, H.S., Jha, S., Kanamaru, N., Kase, T., Kettleson, E.M., Kim, J., Kim, J.S., Kirikae, T., Kita, Y., Kramer, A., Kurita, H., Lange-Grünweller, K., Lee, H., Lee, H.K., Lee, J., Lee, K., Lee, M.H., Lee, S., Li, L., Lin, Y.C., Lipkin, W.I., Lomonossoff, G.P., Luo, C.H., Maddineni, S., Maiti, B.C., Maity, T.K., Markotter, W., Markowitz, L.E., Martins, A.M.C.R.P.F., Masters, P.S., Mastorakos, P., McKinstry, K.K., Misra, V., Mizuno, A., Mortlock, M., Müller, C., Nagalakshmi, G., Nomura, T., Nour, M., Obermann, W., Ohlson, A., Okada, M.,Okuno, Y., Osterhaus, A.D.M.E., Papenfuss, M.R., Paul, R. (120x2=240)		
Unidentified	4 (1.02)	7

Table 3 displays the ranking of authors of research articles. It is observed that there is a total of 390 publications are written by 163 authors' on Coronavirus topic during the study period. Further, it shows that most prolific authors during the year 2001-2020. Akashi, M. published 11 (2.82%) articles with 148 Total Global Citation Score, 2nd position is shared by two authors i.e.: Hamada, K. and Kaneko, T. and published 6 (1.56%) articles each and Akagi, T., Chen, M.Q., De Groot, R.J., Drosten, C., Rottier, P.J.M. five authors individually published 5 (6.41%) articles each on Coronavirus. Top eight authors (1st, 2nd and 3rd Rank holders) contributed 12.3% (48) publications. More than 1/3 of the articles are written by the multi authors by collaborating on this topic. Very thin publications are visible from single-author publications (2.82%), remaining 97.18% of publications are written by joint authors.

Table No. 4

Subject wise Distribution of Publications

Subject Area	No. of Publications	Rank
Medicine	227 (26.42)	1
Immunology and Microbiology	111 (12.92)	2
Biochemistry, Genetics and Molecular Biology	108 (12.57)	3
Veterinary	77 (8.96)	4
Pharmacology, Toxicology and Pharmaceutics	56 (6.51)	5
Agricultural and Biological Sciences	53 (6.16)	6
Chemistry	40 (4.65)	7
Engineering	34 (3.95)	8
Materials Science	28 (3.25)	9
Environmental Science	22 (2.56)	10

Table 4 represents the most productive research area-wise distribution of the publications. Out of the top 10 most productive research areas, maximum number 227 (26.42%) publications are available in the Medicine discipline. This is followed by Immunology and Microbiology discipline with 111 (12.92%) articles and Biochemistry, Genetics and Molecular Biology discipline with 108 (12.57%) articles. 541 publications on Coronavirus is scattered in 25 subject disciplines in these publications. Further, it is known that more than 50% of the publications have belonged Medicine field.

Table No. 5

Document wise Distribution of Publications

Document Type	No. of Publications
Article	405 (74.86)
Review	65 (12.01)
Conference Paper	24 (4.43)
Book Chapter	14 (2.58)
Letter	14 (2.58)
Editorial	7 (1.29)
Note	5 (0.92)
Short Survey	5 (0.92)
Book	2 (0.36)

Distribution of publications in a different type of documents is depicted in Table 5. The topic on "Coronavirus" publications was spread over a range of publication types like Journal Articles with 405 publications (74.86%) followed by Reviews with 65 (12.01%) and Conference Papers 24 (4.43%). First three type of publications together produced more than 91% of the publications. Only Article and Review type of publications are more than average publications. Remaining forms of documents are very less.

Book chapters and Letter's together shared 4th place in publications with 14 (2.58%) publications each. Editorial with 7 (1.29%) publications, 5 (0.92%) publications each are published in the form of Notes and Short Surveys. Very less number of publications are published in book 2 (0.36%) form.

Table No. 6

Source wise Distribution of Publications

Rank	Source Title	No. of Publications	Zone
1.	PLOS One	12 (3.89)	Zone 1=21 Journals
2.	Antiviral Research	9 (2.92)	
3.	Journal Of Virology	7 (2.27)	
4.	Virology	6 (1.94)	
5.	Polymer Preprints Japan	5 (1.62)	
6.	Zhejiang Da XueXueBao Yi Xue Ban Journal Of Zhejiang University Medical Sciences	5 (1.62)	
7.	13 journals having 4 articles each	52 (16.77)	
8.	2 journals having 3 articles each	6 (1.94)	
9.	13 journals having 3 articles each Advanced Healthcare Materials	39 (12.61)	Zone 2 = 44 Journals
10.	31 Journals having 2 articles each	62 (19.84)	
11.	9 Journals having 2 articles each	18 (5.76)	Zone 3 = 94 Journals
12.	85 Journals having 1 article each	85 (27.2)	

Table 6 reveals that PLOS One journal published highest 12 (3.89%) number of publications, Antiviral Research published 9 (2.92%) papers, Journal Of Virology published 7 (2.27%) papers, Virology journal published 6 (1.94%), Polymer Preprints Japan and Zhejiang Da XueXueBao Yi Xue Ban Journal Of Zhejiang University Medical Sciences journal

published each 5 (1.62%) articles. Whereas, 13 journals published 4 articles each and 15 journals published 3 papers each, 2 (0.64%) each publication are available in 41 journals, one article each is published in 85 number of journals in this period on Coronavirus. 308 publications on Coronavirus had been published in 160 journals. The six core journals published 44 (14.26%) articles, of the total journal publications.

Application of Bradford's Law of Scattering

Bradford's Law of Scattering helps in providing overall advice to the librarians to find out the number of core journals in any given subject matter. In this study also, journals are divided into three equal parts having the same number of publications in each part.

Zone 1: Core journals in the Medicine field, is relatively few in number but they have produced approximately 1/3 of all the articles.

Zone 2: is having less quantity of articles but available in more number of journals compared to zone 1 (almost double in number).

Zone 3: in this zone an equal number of publications as in first and second zone, but still a higher amount of journals compared to zone 2 journals.

Table No. 7

Affiliation wise Distribution of Publications

Sl. No.	Affiliation	No. of Publications	Rank
1.	Utrecht University, Netherlands	28 (19.71)	1
2.	Osaka University, Japan	12 (8.45)	2
3.	Rega Institute for Medical Research, Central Belgium	11 (7.74)	3
4.	National Institutes of Health, Bethesda, Maryland	9 (6.33)	4
5.	Japan Science and Technology Agency, Japan	9 (6.33)	
6.	Katholieke Universiteit Leuven, Flanders, Belgium	9 (6.33)	
7.	Erasmus Medical Centre, Rotterdam, Netherlands	9 (6.33)	
8.	Chinese Academy of Sciences, Beijing, China	7 (4.92)	5
9	University of California, Davis, United States	6 (4.22)	6

|	Justus Liebig University Giessen, Gieben, Germany	6 (4.22)	
	Centers for Disease Control and Prevention	6 (4.22)	
	University of California, San Francisco, United States	6 (4.22)	
	Charité – UniversitätsmedizinBerlin, Germany	6 (4.22)	
	Zhejiang University School of Medicine, China	6 (4.22)	
	National Institute of Infectious Diseases	6 (4.22)	
	King Saud bin Abdul Aziz University for Health Sciences, Riyadh, Saudi Arabia	6 (4.22)	

The productivity of the author publications based on their institutions is depicted in Table 7. Here institutions are ranked according to the number of publications published by the institutions. It is found that a total of 160 institutions, including 3436 subdivisions published 549 research papers during 2001 – 2020. The top eight most prolific Universities / R&D organisations/institutions involved in this research have published 94 out of 541 research articles. Among the institutions, 1st place is got by Utrecht University with 19.71% publications, followed by Osaka University and Rega Institute for Medical Research with 8.45% and 7.74% publications

Table No. 8

Country wise Distribution of Publications

Rank	Name of the Country	No. of Publications
1.	United States	145 (19.83)
2.	China	61 (8.34)
3.	Germany	51 (6.97)
4.	India	44 (6.01)
5.	Japan	43 (5.88)
6.	Netherlands	29 (3.96)
7.	Saudi Arabia	29 (3.96)
8.	United Kingdom	27 (3.69)
9.	South Korea	22 (3.00)
10.	Canada	18 (2.46)

Figure No. 3
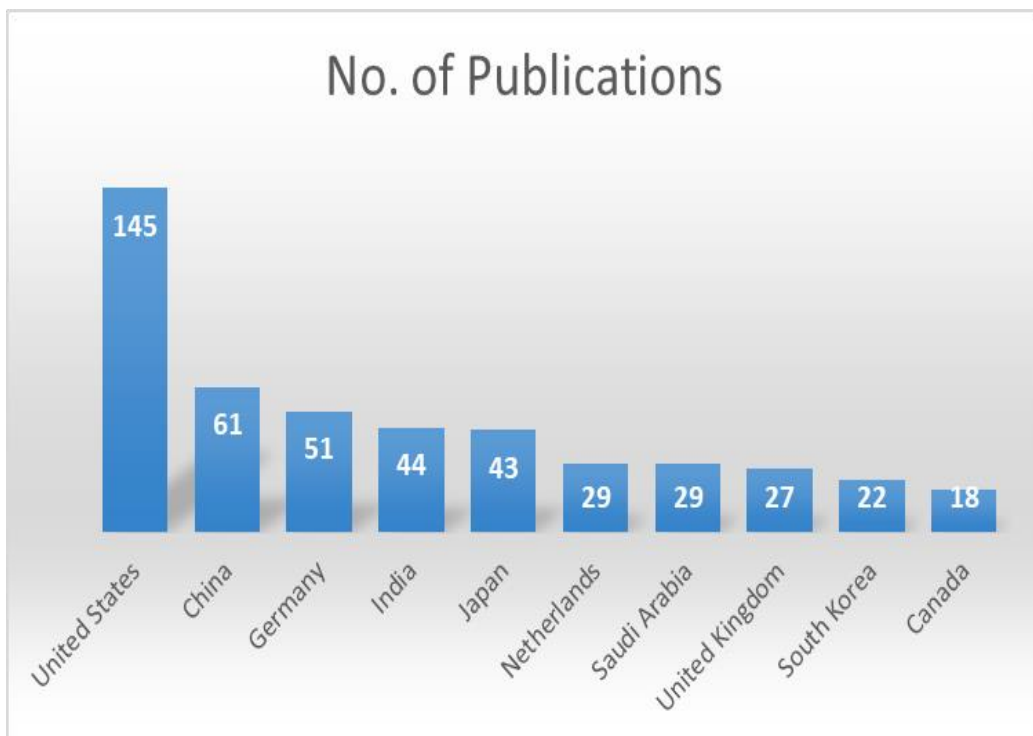
Country-wise ranking is provided in table 8 and figure 3. The 541 publications on the topic of Coronavirus published by different countries. The analysis of the country-wise distribution of the articles in which the researchers have published their works revealed that the highest percentage of the total publications on Coronavirus was published by the USA with 19.83 followed by, China with 8.34% and Germany with 6.97%. India published 44 (6.01%) publications on this topic and ranked 4th nation. It shows that American researchers are very much interested in researching on the Coronavirus topic because this virus is affected a lot on human life and the economy of the USA. It has resulted in more number of research articles. And this study is also supported by the study made by Wen-Ta in his article on Bibliometric Analysis of Severe Acute Respiratory Syndrome related research in the beginning stage published in Scientometric journal in the year 2004[7]. Out of 541 publications, 487 publications are from the top 10 countries. In all, 67 countries published on the Coronavirus topic. The remaining publications were scattered in the journals published from seventy-six countries in this world. Eleven publications are of unidentified countries. 69% of the publications are from the top 10 countries of the world.

Table No. 9

Language wise Distribution of Publications

Languages	No. of Publications	Rank
English	469 (85.42)	1
German	17 (3.13)	2
Chinese	15 (2.76)	3
Japanese	13 (2.39)	4
Spanish	6 (1.10)	5
Polish	4 (0.73)	6
Hungarian	3 (0.55)	7
Dutch, French, Russian, Turkish 4x2 (0.36)=8 (1.44)	2 (0.36)	8
Bulgarian, Croatian, Danish, Greek, Hebrew, Italian, Korean and Slovenian 8x1(0.18)=8 (1.44)	1 (0.18)	9

Table 9 reveals that research publications are published in the nineteen different languages of the world. The English language stood first by publishing 85.42% (469) of the publication during the study period on Coronavirus. Followed by German and Chinese languages with 3.13% (17) and 2.76% (15) publications on the respective languages and stood 2nd and 3rd position in this study. Remaining sixteen languages published just 8.69% publications. Only English language published articles more than average publications. It is confirmed that once again English is the principal language of research communication in this world.

Table No. 10

Access wise Distribution of Publications

Type of Access	No. of Publications
Open Access	243(45)
Print Access	298(55)

It is noticed from the table 10 that, among the publications, 55% of the publications are published in the Printed Journals / Books / Conference Proceedings and others, whereas only 45% of the publications are published in the Open Access journals and other reading materials.

It is understood that gradually use of e-resources is increasing, in this study nearly 50% of the scholars are using e-resources.

6. Findings:

6.1 This analysis indicated that highest amount of publications were published throughout the year 2020 with 55 (10.16%) publications, followed by 2019 with 38 (7.02%) publications, and 2016 and 2017 with 36 (6.65%) publications being published and ranked 1st, 2nd and 3rd place.

6.2 In the first 10 years (2001-2010) publications on Coronavirus is very less 38% only, whereas. Later half from the year, 2011-2020 publications are raised to 62%.

6.3 2.39% of the publications are written by 163 authors' on Coronavirus topic during the study period.

6.4 Single author publications are very less (2.82%) compared to multi-authored (97.18%) publications.

6.5 Highest number of 227 (26.42%) articles are published in the Medicine discipline. This is followed by Immunology and Microbiology discipline with 111 (12.92%) articles and Biochemistry, Genetics and Molecular Biology discipline with 108 (12.57%) articles.

6.6 The topic on "Coronavirus" publications were spread over a range of publication type like Journal Articles with 405 (74.86%) in number is the highest publications followed by Reviews with 65 (12.01%) and Conference Papers 24 (4.43%). Journal articles, reviews and conference papers produced more than 91% of the publications.

6.7 PLOS One journal published highest 12 (3.89%) papers on COVID-19.

6.8 Out of 160 institutions, top 10 institutions published 142 research papers and the rest of the institutions/organisations published 399 research papers respectively. Among the institutions, 1st place is got by Utrecht University with 19.71% publications, followed by Osaka University and Rega Institute for Medical Research with 8.45% and 7.74% publications

6.9 The analysis of country-wise scattering of the publications in which the researchers have published their works revealed that the highest percentage of the total publications on Coronavirus was dominated by the USA with 19.83 followed by, China with 8.34% and Germany with 6.97%. India published 44 (6.01%) publications on this topic.

6.10 Research publications are published in the nineteen languages of the world. But English language stood first by publishing 85.42% (469) of the publication during the study period on Coronavirus.

6.11 Among the publications 55% of the publications are published in the Printed Journals / Books / Conference Proceedings and others, whereas only 45% of the publications are published in the Open Access journals and other reading materials.

7. Conclusion:

Coronavirus is not only a recently emerged fast-spreading disease, at the same time it is a new topic for research scholars also. Although the major Coronavirus Disease 2019 bursts in China, the great percentage of participation from developed nations of the world, imply that COVID – 19 rampant is not just a national concern of any one country but a virus that spread everywhere one must be conscious about it.

These research findings play an important role in knowing which author is working on which topic, where he is working, whom to contact the latest information on this epidemic. Average citations per publication on this topic is 20.79. Now almost all the papers are written by multi-authors, it shows that it is an era of joint authors. Still, research is going on Coronavirus, maybe by the end of this year we may get an effective vaccine for this virus. This study provided a global bibliometric evaluation of COVID-19 studies, which may facilitate ongoing and future research.

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