

COVID-19 Pandemic: reflection on literature

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Abstract- The ongoing threat to the mankind is COVID-19 has shaken the whole world and till date there is no solution for the same. COVID-19 is a new form of coronavirus. There is need of research on COVID-19 to find the antidote/vaccine. As per WHO (4 April 2020) 1,056,159 Confirmed cases and 57,206 deaths from 208 countries have been reported. Thus, to analyze the research trend on COVID-19, the bibliometric analysis has been done on COVID-19 literature extracted from the web of science database for the period of 1st Jan to 31st March 2020. The analysis showed that there are 489 documents and top most sources publishing on COVID are BMJ and Lancet. The top two authors of the field are Mahase E and Drosten C. The most cited paper is Huang CI, 2020 DOI:10.1016/S0140-6736(20)30183-5. The maximum contribution is from China and the top most organization is University of Hong Kong, Hong Kong.

Keywords – COVID-19, Bibliometrics, Coronavirus, 2019-nCoV, SARS, MERS

I. INTRODUCTION

The coronavirus is a family of viruses that can cause a range of illnesses in humans including common cold and more severe forms like SARS and MERS which are life-threatening. The virus is named after its shape which takes the form of a crown with protrusions around it and hence is known as coronavirus. A novel coronavirus (COVID-19, previously referred to as 2019-nCoV) emerged in a seafood and poultry market in the Chinese city of Wuhan in 2019. Human-to-human transmission occurs through close contact. Coronaviruses are a large group of viruses that cause diseases in animals and humans. They often circulate among camels, cats, and bat. Common signs of infection include fever, coughing and breathing difficulties. In severe cases, it can cause pneumonia, multiple organ failure and death. The incubation period of COVID-19 is thought to be between 1 and 14 days. It is contagious before symptoms appears. That is why so many people get infected. Infected patients can also be asymptomatic, meaning they do not display any symptoms despite having the virus in their systems. On March 11, 2020, the World Health Organization characterized the outbreak as a pandemic. COVID-19 has shaken the whole world as per the present reports of WHO (4th April 2020) 1,056,159 Confirmed cases and 57,206 deaths from 208 countries have been reported

Looking to this outbreak, the extensive research is going on to understand this virus and to find the antiviral or vaccine for the same. In order to access its current impact on global scientific research publication on COVID-19, the renowned technique bibliometrics analysis has been done by the using the information available on well-known database i.e. web of science. Bibliometric analysis investigates the progress of any topic and gives a comprehensive assessment of scientific research trends. In recent years, bibliometric analysis has been extensively performed to assess scientific activities in many fields likewise infectious diseases such as Mayaro virus fever, Zika virus, Ebola virus disease, yellow fever disease, dengue, Malaria, influenza, coronavirus and many other.

Thus, in this paper an attempt has been made to compile data available on COVID-19 and to investigate the research characteristics authors, countries, journals, research institutions, citation habits, keywords and country collaboration.

II. METHODOLOGY

The data for the present study has been retrieved from Web of Science (WOS). For fetching the data, all the keywords related to COVID-19 with OR operator has been used in title. The keywords used were (COVID-19 or COVID19 or SARSCoV-2 or SARSCoV2 or SARS-CoV-2 or "china virus" or "Wuhan virus" or "Severe acute respiratory syndrome coronavirus" or 2019-nCoV or 2019nCoV or "corona virus" or coronavirus) for year 2020 in Indexes: SCI-Expanded, SSCI, A&HCI, ESCI databases. 489 documents were published on COVID-19 from 1st Jan -31st March 2020. These documents were further analysed using MS Excel and Bibliometrix-R for predicting the trend of research in terms of most popular sources, prolific author, top contributing organization and countries, top cited papers, popular keywords. In addition to this, the collaboration among the countries has also analysed.

III. RESULTS AND DISCUSSION

It has been noted that, the extensive research is going on COVID-19, in total 489 documents were published in 151 sources by 1892 authors. These 489 documents include article (138), correction (11), editorial material (152), letter (60), news item (106), reprint (1), review (21). The collaboration index is 5.97, which clearly showcase that researchers are working in collaboration. Further, the average citation per document is 2.487, which is high and reflects that authors are observing the research done by other researchers of their community.

Table 1. list the most prolific sources along with their h index, g index and m index, which are publishing on COVID-19. The top most source is 'BMJ-British Medical Journal' with 66 papers followed by 'Lancet', 'Chemical and Engineering News' with 47 and 25 papers respectively. The 'emerging microbes & infections', 'Journal of clinical medicine', 'Nature' have 13 publications each. There is two more Journal of LANCET family are 'Lancet infectious diseases' and 'Lancet respiratory Medicine'. The top cited journals are Lancet with 458 citations, followed by 'New England Journal of Medicine' with 189 citations and 'Nature' with 101 citations. Thus, it can be said that the most impactful articles are published in Lancet.

Table 1. Top prolific journals along with their impact

Source	h_index	g_index	m_index	TC	NP
BMJ-British Medical Journal	3	3	3	31	66
Lancet	8	21	8	458	47
Chemical & Engineering News	0	0	0	0	25
Eurosurveillance	5	6	5	50	22
Journal of Medical Virology	4	7	4	56	18
Emerging Microbes & Infections	3	5	3	32	13
Journal of Clinical Medicine	4	5	4	31	13
Nature	3	10	3	101	13
New Scientist	0	0	0	0	10
Radiology	3	4	3	26	9
Journal of Korean Medical Science	3	4	3	21	8
New England Journal of Medicine	6	7	6	189	7
Journal of Virology	2	4	2	21	6
Lancet Infectious Diseases	1	1	1	4	6
Lancet Respiratory Medicine	1	2	1	4	6
Science	2	2	2	6	6
Travel Medicine and Infectious Disease	2	2	2	4	6
Bioscience Trends	2	3	2	12	5
Microbes and Infection	2	2	2	6	5
Nature Medicine	1	2	1	6	5

*TC=Total Citation, NP=number of publications

Table 2, gives the name of the dominating authors along with their affiliations and the type of document contribution on COVID-19. The author at the top is Mahase E from BMJ, England, he has contributed 24 Newsitem. Drosten C is at the second position from Charité–Universitätsmedizin Berlin, Germany. He has contributed 4 articles, 1 editorial material and 3 Letter. The three authors Akhmetzhanov AR, Linton NM and Nishiura H are from Hokkaido University, Japan working together on COVID-19 and have contributed 7 articles each. The most prolific author belongs to England, Germany, Japan, Hong Kong and China and Among these the maximum authors are from Japan. In context to citation the top two authors are Chen J, from Guangdong Hospital of Traditional Chinese Medicine, China and Yuen KY, from the University of Hong Kong, Hon Kong with 122 and 100 citations respectively. The mapping of the country, with author and university has been pictorially represented in Figure 1.

Table 2. Prolific authors

Author	No of Publication	Affiliation	Country	Citation
Mahase E	24	BMJ	England	19
Drosten C	8	Charité – Universitätsmedizin Berlin	Germany	79
Akhmetzhanov AR	7	Hokkaido University	Japan	18
Linton NM	7	Hokkaido University	Japan	18
Nishiura H	7	Hokkaido University	Japan	18

Yuen KY	7	The University of Hong Kong	Hong Kong	100
Chen J	6	Guangdong Hospital of Traditional Chinese Medicine	China	122
Hayashi K	6	Hokkaido University	Japan	18
Kinoshita R	6	Hokkaido University	Japan	18
Kobayashi T	6	Hokkaido University	Japan	18
Li F	6	Guangzhou Med Univ	China	20

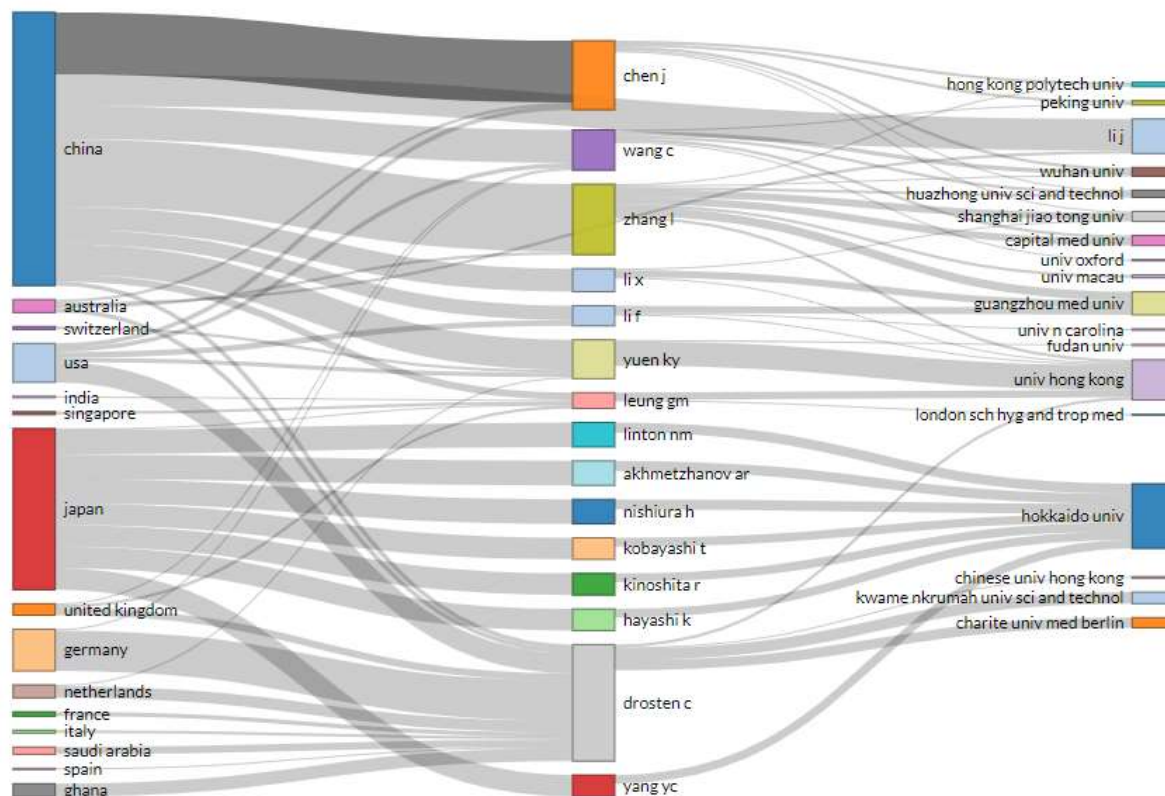


Figure 1. Mapping of top contributed country along with author and organisation

Table 3. gives the rank wise organization working on COVID-19. The maximum contribution is from ‘University of Hong Kong, Hong Kong’ i.e. 37 articles, followed by the ‘Wuhan university, China’ with 30 articles, ‘Chinese University of Hong Kong, Hong Kong’ with 19 articles, ‘Capital Med university, China ‘ with 18 articles and at fifth position is ‘Fudan University, China’ with 16 contribution. The maximum contribution is from China followed by Hong Kong, UK. There is a significant contribution from the countries Japan, Ghana, South Korea, France and Berlin.

Table 3. Top rank organization

Rank	Organisation	Country	Contribution
1	Univ Hong Kong	Hong Kong	37
2	Wuhan Univ	China	30
3	Chinese Univ Hong Kong	Hong Kong	19
4	Capital Med Univ	China	18
5	Fudan Univ	China	16
6	Huazhong Univ Sci and Technol	China	15
6	Shanghai Jiao Tong Univ	China	15

7	Peking Univ	China	11
7	Sun Yat Sen Univ	China	11
8	Guangzhou Med Univ	China	10
8	Hong Kong Polytech Univ	Hong Kong	10
8	Sichuan Univ	China	10
9	London SchHyg and Trop Med	UK	9
9	Univ Oxford	UK	9
10	Hokkaido Univ	Japan	8
10	Kwame Nkrumah Univ Sci and Technol	Ghana	8
10	Myongji Hosp	South Korea	8
11	Aix Marseille Univ	France	7
11	ChariteUniv Med Berlin	Berlin	7
11	Chinese Acad Sci	China	7

Table 4 gives the citation analysis country wise. The China is at the top with 863 citations and there is huge difference between the first and second position, USA is at second position with 114 citations followed by Germany, UK, Korea, Japan, Netherlands, Switzerland, with 53, 26,23,18.13, 10 respectively.

Table 4. Top countries with citation impact

Country	Total Citations	Average Article Citations
China	863	6.49
USA	114	2.71
Germany	53	4.42
United Kingdom	26	0.93
Korea	23	1.77
Japan	18	2.00
Netherlands	13	3.25
Switzerland	10	1.25
Vietnam	8	8.00
Ethiopia	6	3.00
Italy	6	0.46
Greece	5	5.00
France	4	0.67
Malaysia	3	1.50
Singapore	3	0.50
Argentina	2	2.00
Colombia	2	1.00
Taiwan	2	0.40
Australia	1	0.33
Canada	1	0.11

The most cited documents are presented in Table 5. These documents can be beneficial for the researchers, to find the most important information on COVID-19 as these are popular among the researcher community. The top most

three paper is Huang Cl, 2020, Lancet with 150 citations followed by Zhu N, 2020, New Engl J Med with 102 citations, Chan Jfw, 2020, Lancet with 81 citations. The top cited papers are from the source Lancet, New England Journal of Medicine, Naure, International Journal of infectious diseases, Cell research, Journal of Virology, Eurosurveillance, Journal of medical virology, Emerging Microbes, Science China Life Science

Table 5. Most cited document

Paper	Total Citations
Huang Cl, 2020, Lancet	150
Zhu N, 2020, New Engl J Med	102
Chan Jfw, 2020, Lancet	81
Zhou P, 2020, Nature	75
Chen Ns, 2020, Lancet	70
Lu Rj, 2020, Lancet	44
Wu Jt, 2020, Lancet	34
Rothe C, 2020, New Engl J Med	30
Wang C, 2020, Lancet	29
Hui Ds, 2020, Int J Infect Dis	27
HolshueMI, 2020, New Engl J Med	25
Wang MI, 2020, Cell Res	20
Wu F, 2020, Nature	19
Wan Ys, 2020, J Virol	18
Corman Vm, 2020, Eurosurveillance	17
Chen Y, 2020, J Med Virol	16
Ji W, 2020, J Med Virol	15
Munster Vj, 2020, New Engl J Med	15
CHAN JFW, 2020, EMERG MICROBES INFEC-A	15
Xu Xt, 2020, Sci China Life Sci	14

The keywords play the vital role, as they represent the zone of the research and detect trending research topics. It gives the research trend of the author's opinion. Figure 3, gives the mapping of the keywords assigned by the author to designate the domain in which, they are working. The most popular keywords used are Coronavirus, 2019 n COV, COVID-19, SARS COV2, pneumonia, Wuhan, MERS COV, novel coronavirus, acute respiratory syndrome, influenza, antibodies and so on. These all keywords clearly reflects the researcher community is trying to identify the difference between previous coronavirus diseases and present outbreak of novel coronavirus. The researchers are also linking this with bats and camels and how the transmission has been made.

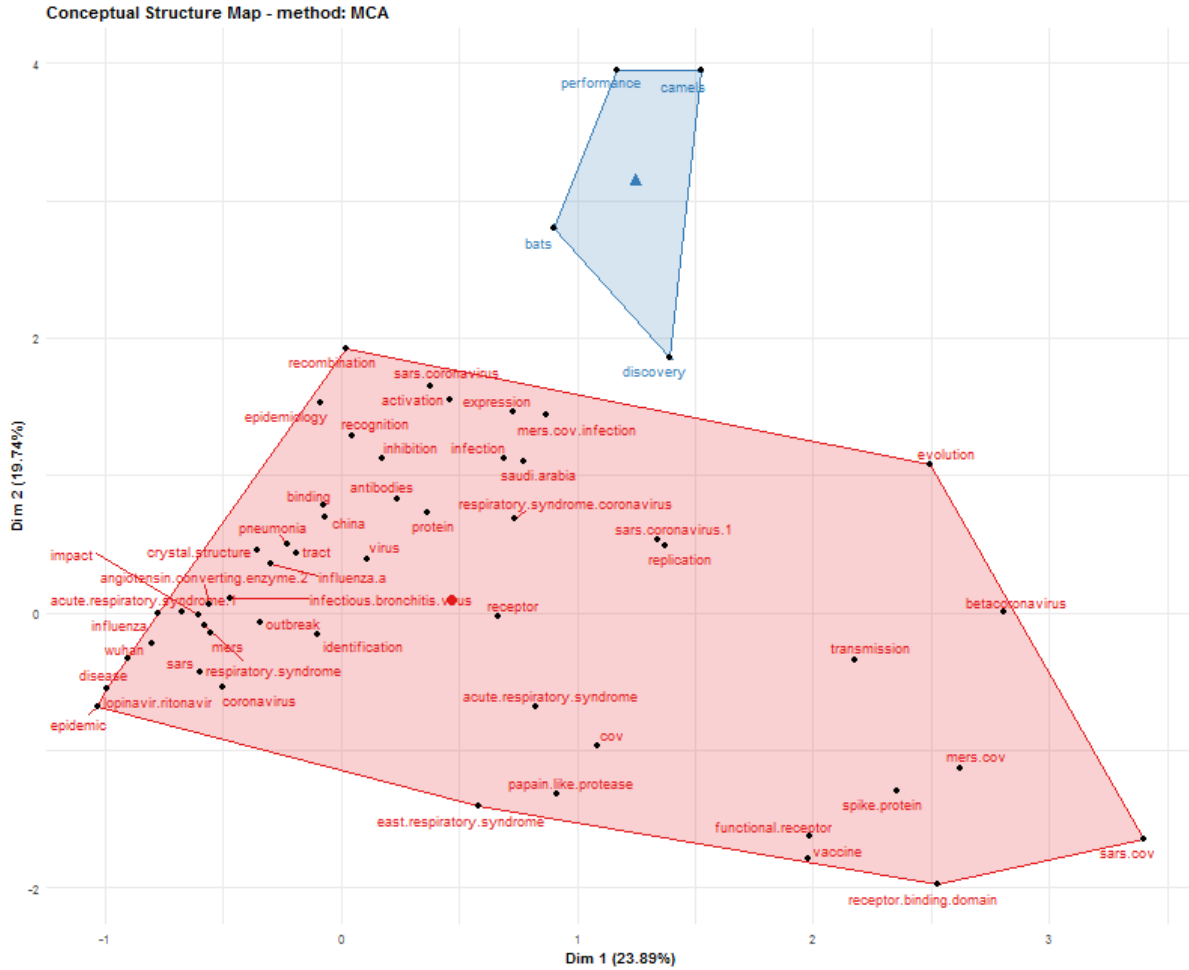


Figure 3. Author Keywords conceptual

Figure 4, represents how the researchers from different countries are working to together to fight with this epidemic. The maximum collaboration is between China and USA of 27 articles. China is working in Collaboration with 34 countries. The countries having the collaboration of 5 or more paper with China are USA, UK, Canada, Germany, Italy, Australia, Spain, Singapore and India. USA is connected to 22 Countries, UK is connected to 32 countries. India is working in collaboration with 10 countries. Thus, whole world is working together, to find the solution to this epidemic.

Country Collaboration Map

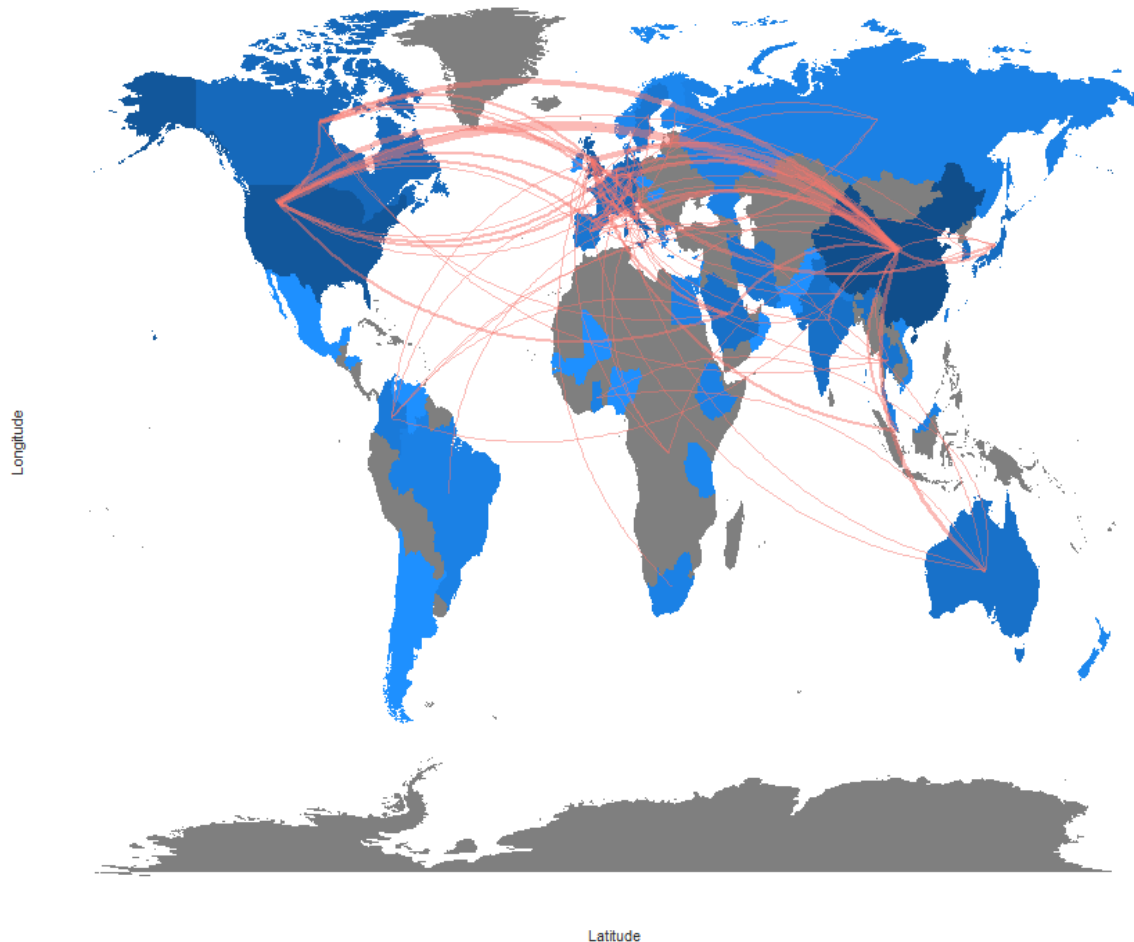


Figure 4. Country collaboration map

IV. CONCLUSION

Henceforth, an attempt has been made to compile all the literature on COVID-19 under one roof, so that researchers working on it get the concise report of the COVID-19 and they can utilize this data to save our community. The main highlights of the analysis are as follows

- 1) In total there were 489 documents, including article, correction, editorial material, letter, news item, reprint, review
- 2) The top three journals publishing on COVID are BMJ, Lancet and Chemical and Engineering News.
- 3) The top three universities are University of Hong Kong, Wuhan University and Chinese University Hong Kong.
- 4) The top two most cited papers are Huang CJ, 2020 Lancet (10.1016/S0140-6736(20)30183-5) and Zhu N, 2020, New England J medicine (10.1056/NEJMOA2001017)
- 5) In total 55 countries are working on COVID 19 and the majority of contribution is from China. Furthermore, these countries are working together to find the solution to pandemic

Thus, it is hoped that this work will be providing the necessary information to the researcher community to understand the research going on COVID-19 and they can build their contacts with researchers worldwide to beat the COVID-19 war.

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