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A SCIENTOMETRIC ANALYSIS AND VISUALIZATION OF COVID-19 RESEARCH LITERATURE

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Abstract *Novel Coronavirus disease (COVID-19) is the infectious disease caused by the Coronavirus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The World Health Organization learned of this new virus from the Wuhan city cases in China on December 31st, 2019. COVID-19 is a major health concern worldwide due to its quick widespread around the globe. This bibliometric study evaluated the published scientific literature to assess the evolution of knowledge on COVID-19, identify the leading research stakeholders, and analyze the conceptual areas of knowledge development in this domain. Bibliometric data on COVID-19 related literature published until August 2020 were retrieved from the Web of Science Citation Database. Major areas identified through evaluating keywords and text data including Co-authorship networks of authors, geographically collaboration of organizations and countries co-authorship networks, Bibliographic coupling of sources associated with COVID-19. The Current Status of COVID-19 research shows early development in different areas of knowledge. Global research collaboration should be at a high pace and be encouraged to strengthen evidence-based decisions to prevent the COVID-19 pandemic and aftermath.*

Keywords: *Scientometric Study, COVID-19, Novel Coronavirus Disease, Visual Analysis, COVID-19 Visualization, WHO*

INTRODUCTION

There are so many recommended rules and Standard Operating Procedures (SOPs) out there about how governments, wellbeing experts, and the overall population ought to react to the COVID-19 pandemic. WHO has issued direction and guidance consistently in this regard and played a vital role. Coronavirus disease was first reported in December 2019 in Wuhan, then spread to all the China provinces, and has become a global pandemic (Rothan & Byrareddy, 2020). As per the WHO weekly Operational Update on COVID-19, by October 20th, 2020, 39023292 patients were confirmed worldwide and death cases were 1099586 ("WHO | World Health Organization" n.d.), which resulted in great public concern. Chinese scholars published a series of descriptive research about the clinical features of COVID-19. The WHO has declared COVID-19 to be a pandemic, with the virus infecting more than 1,00,000 persons in most countries as of March 15th this year (Sohrabi et al., 2020; Khachfe et al., 2020). Since January 2020, worldwide joint efforts have been focused by 24*7 on dealing with this emerging pandemic (Phelan, Katz & Gostin, 2020). The virus's high infectivity rate has been a problem in countries where healthcare facilities have become saturated and unable to accommodate patients (Spina et al., 2020). Until now, the WHO's and the United States Centre for Disease Control and Prevention's (CDC) directives for managing COVID-19 have been limited to infection control and symptomatic management of patients. No antiviral drugs/vaccines are available for the Coronavirus (Guo et al., 2020). Indian Council of Medical Research (ICMR) in India is also very proactive, coordinating with WHO, other international bodies, and government institutions in India in respect to SARS-CoV-2 (COVID-19) Testing Status ("Indian Council of Medical Research | Government of India" n.d.). This study aims to visualize research output on COVID-19 during Jan-Aug 2020 since its outbreak in December 2019 and identify the prolific authors, institutions, and countries involved in COVID-19 pandemic research and related studies. Bibliometric analysis is a statistical method that provides a quantitative analysis of the research publications concerned about one particular topic, scientific research that helps in evidence-based descriptions, comparisons, and research output visualizations. A bibliometric method was applied using the Web of Science. Literature Review: Based on past several studies on public health, infectious disease, viruses, etc., the WHO confirmed and named this virus "Coronavirus" or "COVID-19," which got spread from Wuhan City, China. Coronavirus disease has spread rapidly from one country to another in a concise period, leading to increased scholarly articles' production by scholars to understand the nature, causes, and prevalence measures of

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current disease. Few recent studies are discussed here to demonstrate the objectives of this study.

Wang and others conducted a scientometric study on global health based on 14692 WOS core collection data and visualized and comprehensively mapped the global health field (Wang et al., 2020). The Scientometric Study of SARS, Mars and COVID-19, the study by Haghani, focused on diseases based on the current pandemic virus and its chronic coronavirus family members. He found in the study 12000 research projects in less than 5 months and more than 30,000 items indexed with the end of his observations of the year 2020 approximate 80,000 projects done or exceeds data items (Haghani & Bliemer, 2020). Chen did a bibliometric study that visualised the research hotspot and correlations to mapped clinical medicine research literature (Chen et al., 2020). Higaki focused on co-authorship networks and the correlation of authors in machine learning applications and computational methods used in medical research (Higaki et al., 2020). They compared the study from January 1st to June 30th of the two world's largest citation databases, WOS, and Scopus, indexed data commonly of COVID-19 research publications by Teixeira da Silva (Teixeira da Silva, Tsigaris & Erfanmanesh, 2020) others. The bibliographic study by Zyoud (Zyoud & Zyoud, 2020) mapped the coronavirus disease literature on currently emerging topics of COVID-19 research and on future hot topics. Also discussed are clinical features studies, pathological findings and therapeutic design, care facilities preparation and infection control, and maternal, perinatal, and neonatal outcomes. Studied and analyzed 3693 publications on COVID-19 of Scopus indexed literature, and they found in the study that the most affected country China has the biggest research output publication discussed other indicators (Huded & Balutagi 2020).

METHODS

The current study was conducted using the bibliographic/citation database named Web of Science (WOS). The authors obtained bibliographic data on September 23rd, 2020, to analyse the contribution of publications on COVID-19. In this study, we have done the comprehensive bibliographic search using the words "COVID-19" or "Coronavirus disease" or "SARS-CoV-2" or "SARS-CoV-2" or "Coronavirus disease 2019" or "CV-19" or "CV19" or "Coronavirus" or "Novel Coronavirus" which were published between January and August 2020. The authors obtained 31,728 records in the first search, excluding English language records in first stage filtering and obtained records 30869. After the second stage, refining in this study, only journal articles are considered, and reviews papers and other types of documents are excluded. The final records with citation information were retrieved from COVID-19 from January 1st 2020, to August 31st 2020. During this period, authors had identified a total of 10,255 publications in the WOS database. However, in the present study, the authors focused only on journal articles and reviews published during the selected time, as mentioned above. Authors found 10,255 records in this database containing complete bibliographic details like author, title, source, etc. These have been used for calculation and bibliometric analysis.

In the current study, the authors used R language to obtain basic analysis about the data collections. Vosviewer is used for mapping and network visualization of COVID-19 literature in a more specific context. The basic analysis of COVID-19 documents and their collections are defined in Table 1. A study of 10255 papers related to the COVID-19 found that 53161 authors contributed to the said documents. The 1945 journal sources used for publication during the study period also observed keywords plus (7903) and author keywords (14206). The analysis also depicted the average citation per document is 12.70, and co-authors per document are 7.47. This study also shows that multi and single-author documents are 52408 and 753, respectively. Papers per author are 0.193, and authors per document are 5.18. During the analysis, the authors have also observed that the document collaboration index is 5.54.

The analysis was done with the following parameters: document co-authorship; authors, organizations and countries and Co-occurrence; all keywords, author keywords, and keyword plus with top-cited articles. The node size demonstrates document frequency; links and their thickness represent the collaboration relationship and the strength rate of collaboration. Word occurrences show the frequency of words in the particular domain literature.

Table 1: Main Information About the Documents and Collections

Documents Data Description	Numeric Values	Documents Data Description	Numeric Values
Timespan	JAN-AUG	**Authors**	
Year	2020	Authors	53161
Sources (Journals, Books, etc)	1945	Author Appearances	76592
Documents	10255	Authors of single-authored documents	753
Average citations per documents	12.70	Authors of multi-authored documents	52408
Document Types		**Authors Collaboration**	
Articles	8346	Single-authored documents	799
Review	1909	Documents per Author	0.193

Documents Data Description	Numeric Values	Documents Data Description	Numeric Values
Keywords		Authors per Document	5.18
Keywords Plus (ID)	7903	Co-Authors per Documents	7.47
Author's Keywords (DE)	14206	Collaboration Index	5.54

RESULTS AND ANALYSIS

Literature Growth: In the present study, we have observed and focused on the growth of research publications in the COVID-19 literature in Fig. 1. We found that 10255 published articles are suitable from January to August 2020. In this study, the months of February and August have seen a decrease in literature output. The highest publications showed in July with 28.04% (2876). The scatter dots also depicted the citation pattern and found the highest number of citations, 23094 (17.74%) in May 2020, and the lowest citation, 2818 (2.16%), in January 2020. After May, citation trends declined.

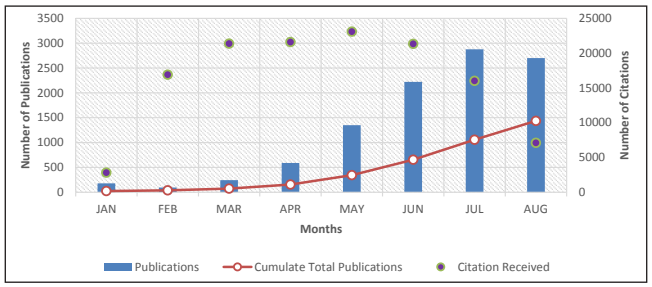

Fig. 1. COVID-19 Literature Growth and Citation Pattern

Authors Co-authorship Networks: About Fig. 2, network visualization of co-author's documents, presented in association strength of authors by documents frequency, threshold minimum frequency is 5 of an author. The network is divided into 16 broad clusters, the entire 16 clusters depicted in 4 different colors to show each cluster frequency capacities. The current visualization has 363 nodes and 1511 links to represent clusters co-relations with each other. The largest cluster #1 has 98 authors represents 710 documents with red color and in a central position of network with the highest 692 (7.06% of items) link, but total link strength weight is 805 (8.21% of items weight links), followed by Cluster #2 have 36 authors in dark green color, and nearest position in the cluster #1 with 266 (7.39% of items) links strength represents 246 documents. The lowest cluster #16 have only 5 items but is near the central position based on their links (10.14% of items and 22.20% of items weighted link). Cluster #7 has 18 authors, but their links and total weighted link strength are high: 387: 1846 (21.50% and 102.56%). The highest citation received was 48422 (weight normalization citation average; 45.67) by cluster #1, but about 98 authors in cluster #13 and cluster #2 have the highest weight normalization citation average, 104.93 and 55.59 of the item's capacity as 13 and 36.

In terms of authorship collaboration, Wang Wei has 22 documents with the highest links 30 and total link strength weight is 39 in cluster #5, and another author Chen, Yaolong have 16 papers and 26 links, but total link strength weight is very high, 161 in cluster #7. The highest documents 26 published by Yuen, Kwok-Yung with 2302 citations, and the highest citation 5133 received by Liu, Ying with 13 documents.

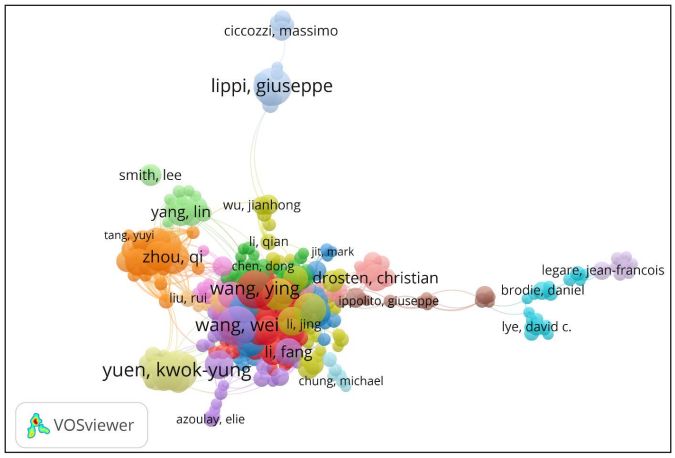

Fig. 2: COVID-19 Publications, Co-authorship Networks of Authors

Collaboration of Organizations and Countries Co-Authorship Networks: The COVID-19 publications networks build by region and organizations based on the collaboration of organizations and countries. As shown in Fig. 3, organizations' co-authorship network has 364 items and 8215 links, divided into 7 broad clusters. The largest Clusters #1 and cluster #2 have 102 and 101 articles, cover up 57.85% of documents, and the rest of the clusters have represented the remaining documents' frequency. Cluster #2 have the highest links (6224) with the highest total link strength weight (TLSW) 11744, followed by cluster #1 (3960) and (6328). Cluster #3 is top in terms of citations (155441). The average is 61.67. The nodes' size indicates the strength of publications, and connections show a co-relationship between two or more nodes. The biggest node in size is "Huazhong University of Science and Technology, Wuhan, China", which have contributed the highest 321 documents with 16734 citation and 118 links connectivity. Followed by "Wuhan University, China" (321) and "Harvard University USA" (196). The "Harvard Medical School,

Boston, USA" collaboration rate is high with their 197-link capacity, followed by "University of Toronto, Canada" and "University of Oxford, UK" have 154 and 152, respectively. The "Harvard Medical School, Boston, USA" is also top in TLSW 671 and "Huazhong University of Science and Technology," second position with 460.

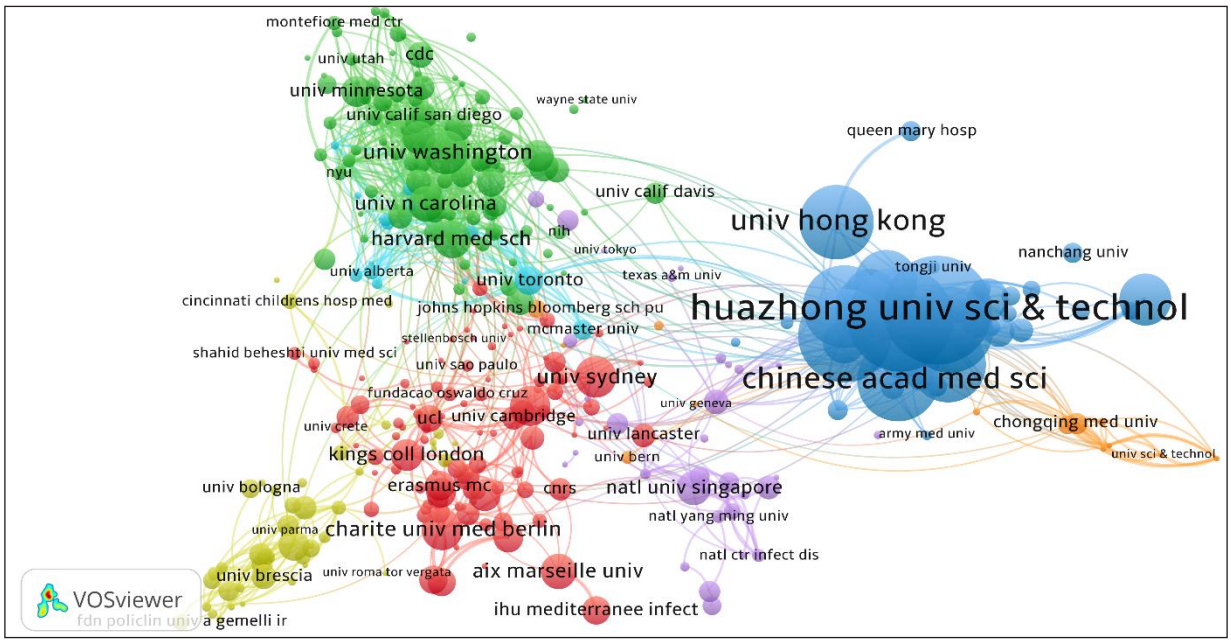

Fig. 4: Bibliographic Coupling Networks of Organisations on COVID-19 Publications

The co-country network shown in Fig. 4, web of science research output of COVID-19, was depicted to co-authorship countries' co-authorship networks. A minimum of 5 documents of country criteria is used for mapping the network and analysis. The current networks have 94 nodes and 4220 links to show the countries' connectivity, divided into 5 broad cluster groups by different colors and sizes. The network map density is high, where there are huge links to show the co-relations between countries. The biggest cluster #1 in the network has 31 countries representing the highest 4839, in red color in networks. Cluster #3 has 18 nodes and 785 links but has the highest citation weight: 89241 and a normalization citation weight of 390.4438 with an average normalization citation weight of 0.750794. The lowest cluster #5 in the network has only 3 members, represents 1095 documents with 191 links, but the normalization citation weight is 330.8147, and the average normalization citation weight is very high with 0.8312 top in the network.

The USA, England and Italy contributed 3299, 85 and 81 research articles on COVID-19, respectively. India has in the top ten with a 9th position in this globally ranked publication with 432 documents. The network had a big red ring to present the USA, highest links frequency with 92 and total link strength weight 3136. The most affected countries on COVID-19 produced highest publications such as Peoples of China and Italy have in 2nd and 3rd in COVID-19 related research articles as 2553 and 1270, respectively. The highest citation received by Peoples of China is 75231, and the average citation per paper is 31.97, followed by the USA (35062) and England (12441). Venezuela published only 6 documents, and per paper, an average citation of 37 is the highest among countries.

Table 2, which describes the detailed results of highly cited institutes, is exciting because the current virus COVID-19 is found first in Wuhan, China and spread worldwide. This analysis and results reflect all top 10 cited institutes belonging to china; the details are given in Table 2. The "Huazhong university of science and technology" has 321 documents with 16734 citations and is top in TLSW. Followed by "Wuhan University" and "Capital Medical University" 2nd and 3rd rank have the highest citations as 15548 and 12591, respectively. The "Tsinghua University" have 5th ranked but top in average citation score 193.12, followed by 6th and 8th rank institutes "Chinese Academy of Medical Science" (161.00) and "Chinese Academy of Medical Science and Peking Union Medical College" (127.13).

Table 2: Highly Cited Institute with Their Collaboration Strength

Rank	Institutes	Citations Frequency	Documents	Avg. Citations	Links	TLSW	Cluster
1	Huazhong University of Science and Technology, China	16734	321	52.13	260	2210737	2
2	Wuhan University, China	15548	217	71.65	260	1548180	2
3	Capital Medical University, China	12591	107	117.67	260	666869	2
4	Chinese Academy of Sciences, China	10840	120	90.33	260	684527	3
5	Tsinghua University, China	10042	52	193.12	260	266166	3
6	Chinese Academy of Medical Sciences, China	9660	60	161.00	260	418518	2
7	University of Hong Kong, Hong Kong	8294	105	78.99	260	421092	3
8	Chinese Academy of Medical Sciences & Peking Union Medical College, China	5975	47	127.13	260	322635	2
9	Shanghai Jiao Tong University, China	5673	99	57.30	260	697994	2
10	Fudan University, China	3946	122	32.34	260	818176	2

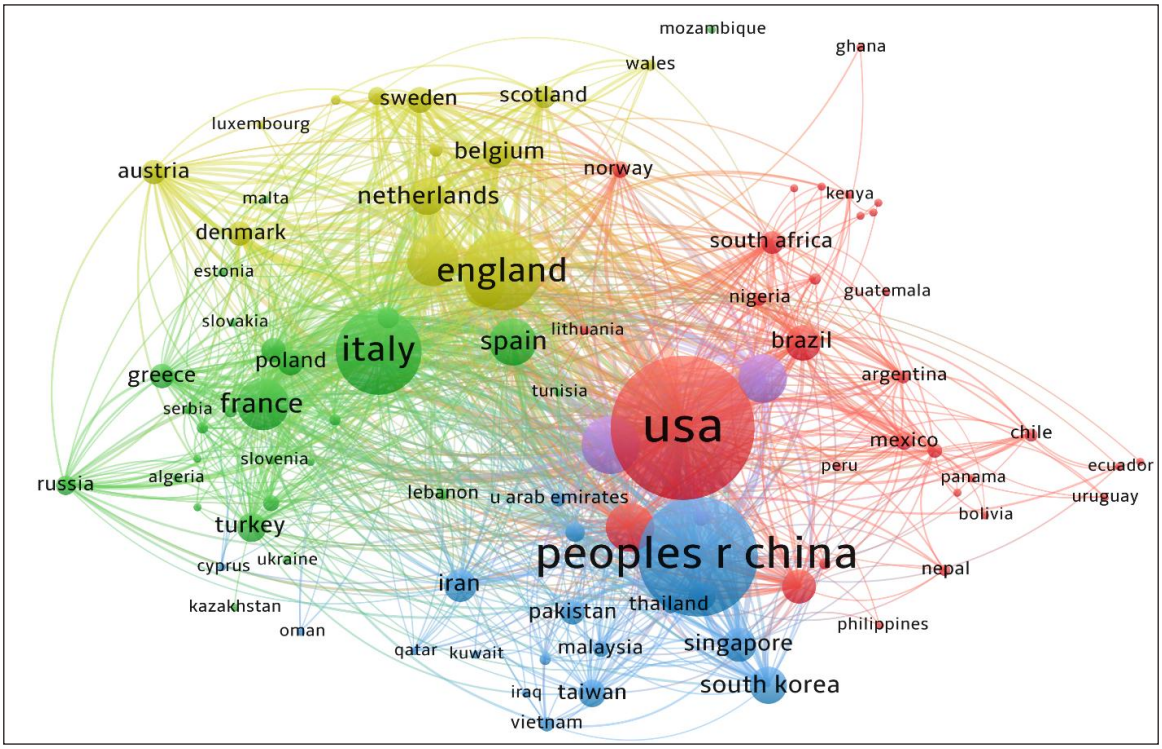

Fig. 5: Collaboration Countries Network Map of COVID-19 Published Literature

Bibliographic Coupling of Sources: Fig. 5 present the Vosviewer analysis outputs of cited journals based on the following parameters like frequency of documents, citations, average citation, link strength, total link strength weight, Normalization of citation, and average normalization citation weight of journal, including cluster information. The minimum number of documents selected is 10 by a source to map and analyse COVID-19 research publications. The cited journals network analysis map has 233 nodes (denotes source journals) and 51618 links representing 6001 document collaboration. The COVID-19 publication of journals network is divided into 5 broad clusters, and the largest cluster #1 has 84 members representing 2580 documents. Followed by Cluster #2 (54 Documents) and Cluster #3 (48 documents).

Analysis of top-cited journals presented in Table 3, based on certain parameters like citation frequency, number of documents, average citation per paper, link strength, and cluster. The top journal is "Lancet" 38 articles received the highest 16062 citations as per citation frequency. The

second-ranked journal, "New England Journal of Medicine" (24 documents), has 11071 citations but is the top in average citation per paper. The top-most publications on COVID-19 the journal "International Journal of Environmental Research and Public Health" have 300 documents with 941 citations, and ACPP is 3.14. Followed by "Plos One" and "Psychological Trauma-Theory Research Practice and Policy," published 144 papers by each. We observe in the analysis a high number of documents not got citation ratio.

Fig. 6: A Network Map of Source Journals on COVID-19 Research Output

Table 3: Highly Cited Frequency Source in COVID-19 Research Publications

Rank	Source	Citations	Document Frequency	Avg. Citations Per Paper	Link Strength	Cluster
1	Lancet	16062	38	422.68	230	1
2	New England Journal of Medicine	11071	24	461.29	228	2
3	Journal of the American Medical Association	5044	15	336.27	228	2
4	Nature	3965	29	136.72	230	4
5	Journal of Medical Virology	3815	64	59.61	228	3
6	Science	3087	42	73.50	230	4
7	Radiology	2705	18	150.28	223	3
8	Cell	2563	29	88.38	228	4
9	Lancet Respiratory Medicine	2291	13	176.23	226	2
10	International Journal of Antimicrobial Agents	2146	42	51.10	228	4

Co-Occurrence of Keyword Analysis: Keyword analysis is an important tool to specify the scientific domain in a specific subject area. The co-occurrence of all types of keywords (including author and keyword Plus) was analyzed with COVID-19 research publications. We explored the top occurred keywords in the networks, for analysis and mapping have fixed the criteria, those keywords occurrence minimum of 25 times, to do analysis and depicted the cluster viewing graphs. The COVID-19 research associated keywords co-occurrence networks represent 439 nodes and 44836 link connections. The network divides into 3 broad clusters, and cluster #1 has the highest 193 keywords (occ. 15234), followed by cluster #2 and #3 keywords, and occurrences have 161 (11396) and 85 (9513), respectively. Cluster #2 has the top with 15234 keywords co-occurrences and also heights TLSW with 66918. The top keyword in the networks, "COVID-19", represents the red color in cluster #1. Followed by "Coronavirus" (Occ. 2123) and "SARS-COV-2" (1919). The most heightened link connection, "Coronavirus," has 438, and the second position has "COVID-19", 436.

We also analyzed keywords monthly to observe terms trend occurrences with their growth and variations represented

in Table 4. According to analysis, we observe the keyword "COVID-19" top every month except it has 5th position in February. The "Coronavirus has got the position in the top 5 till JAN to AUG. "Pneumonia" has got a position in the top 5th in monthly slice 7 times, followed by "SARS-COV-2" and "SARS" with 6 times, "Acute respiratory syndrome" "2019-ncov", "Outbreak" and "Pandemic" each have come once in top 5th position.

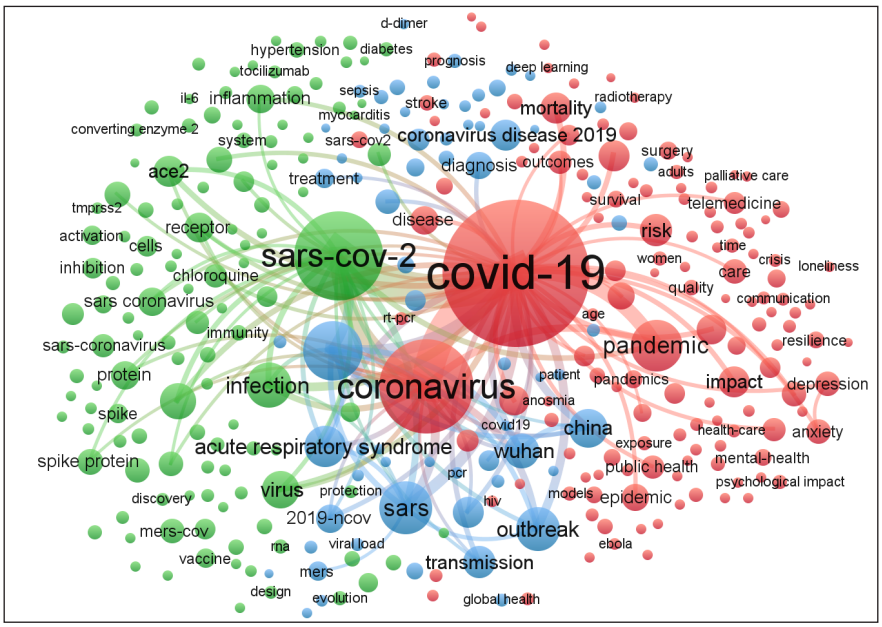

Fig. 7: Co-Occurrence Network of All Keywords

Table 4: Top Keywords in a Month to Observe that Occurrence Growth and Variations in Research Trends Terms

Months	Keywords	R	Occ.	% KW Occ.	Links	Avg. Citations	Months	Keywords	R	Occ.	% KW Occ.	Links	Avg. Citations
JAN	COVID-19	1	201	13.03	61	1.45	MAY	COVID-19	1	823	17.36	294	10.97
	Sars-cov-2	2	88	5.27	53	0.98		Coronavirus	2	336	7.09	264	17.63
	Coronavirus	3	68	4.07	52	5.12		Sars-cov-2	3	313	6.6	251	15.68
	Pneumonia	4	36	2.15	35	4.58		Pneumonia	4	166	3.5	195	29.20
	Acute respiratory syndrome	5	23	1.38	34	20.39		SARS	5	136	2.87	207	41.55
FEB	Coronavirus	1	31	6.3	16	43.71	JUN	COVID-19	1	1056	17.18	410	6.70
	SARS	2	19	3.86	15	612.42		Coronavirus	2	459	7.47	375	12.28
	2019-ncov	3	15	3.05	13	89.07		Sars-cov-2	3	394	6.41	340	9.34
	Outbreak	4	15	3.05	14	222.13		Pneumonia	4	190	3.09	245	22.03
	COVID-19	5	12	2.44	11	45.50		SARS	5	142	2.31	243	18.94
MAR	COVID-19	1	77	7.44	38	27.30	JUL	COVID-19	1	1447	18.63	525	4.78
	Coronavirus	2	72	6.96	48	45.76		Coronavirus	2	546	7.03	440	5.64
	Sars-cov-2	3	41	3.96	37	52.29		Sars-cov-2	3	514	6.62	425	7.01
	SARS	4	29	2.8	37	184.93		Pneumonia	4	227	2.92	276	7.00
	Pneumonia	5	25	2.42	34	187.36		SARS	5	162	2.09	291	7.54

Months	Keywords	R	Occ.	% KW Occ.	Links	Avg. Citations	Months	Keywords	R	Occ.	% KW Occ.	Links	Avg. Citations
APR	COVID-19	1	268	13.13	99	16.97	AUG	COVID-19	1	1393	17.94	512	1.90
	Coronavirus	2	149	6.75	91	27.58		Sars-cov-2	2	479	6.17	377	2.35
	Sars-cov-2	3	116	5.25	89	18.12		Coronavirus	3	465	5.99	417	2.71
	SARS	4	71	3.21	79	83.82		Pandemic	4	181	2.33	242	1.04
	Pneumonia	5	66	2.99	82	72.97		Pneumonia	5	154	1.98	242	5.17

Co-Occurrence of Subject Categories: WOS subject category analysis and classification done in this study comes from the WOS citation database. Co-occurrence analysis of subject categories allows us to understand the main subjects involved in the research intuitively. Fig. 6 focused main and most impacted subject categories, which are the highest used in the COVID-19 study. The ring size and color links represent the frequency and collaboration of each subject. In the figure boldness of items indicate the highest frequency of articles. The top followed subject category is listed in Table 5, with co-occurrence frequency and centrality by cluster-ID. According to Fig. 7 and Table 5, the most impacted subject categories in COVID-19 research are "General & Internal Medicine", "Medicine, General & Internal", "Public, Environmental & Occupational Health", and "Infectious Diseases" the detailed information shown in Table 5.

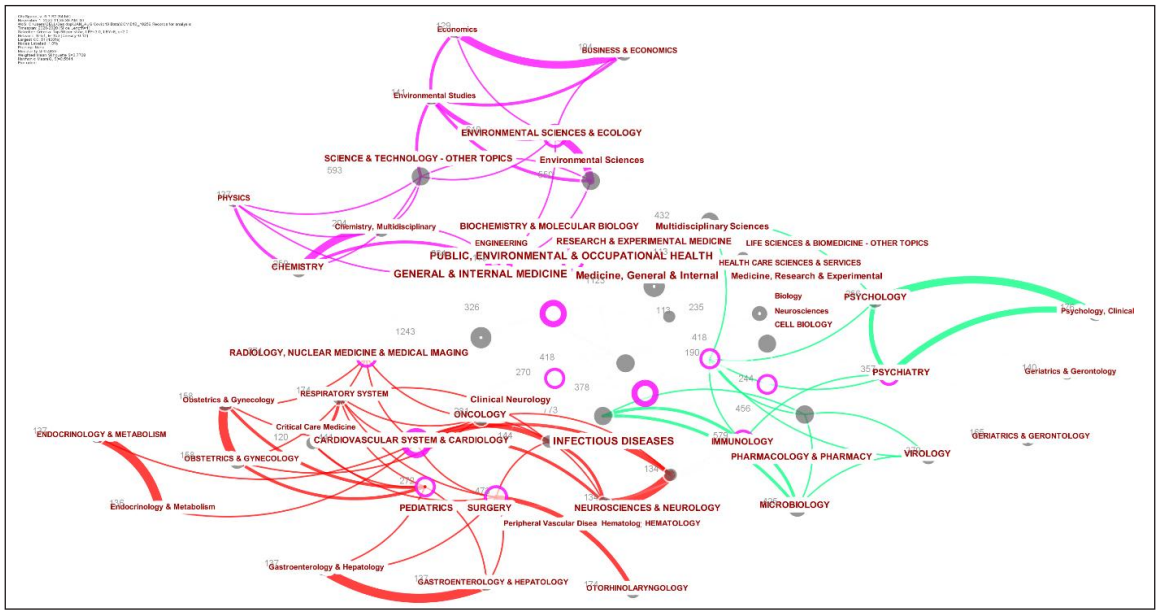

Fig 8: Co-Occurrence Map of the Subject Category

Table 5: Topmost WOS Subject Category Used in COVID-19 Research

Rank	Subject Category	Freq	Centrality	Cluster ID
1	General & Internal Medicine	1243	0.1	4
2	Medicine, General & Internal	1123	0.03	4
3	Public, Environmental & Occupational Health	884	0.17	4
4	Infectious Diseases	773	0.09	1
5	Environmental Sciences & Ecology	610	0.18	2
6	Science & Technology - Other Topics	593	0.09	2
7	Immunology	579	0.15	1
8	Environmental Sciences	550	0.04	2
9	Surgery	473	0.18	0
10	Pharmacology & Pharmacy	456	0.07	1

Highly Cited Articles: The highly cited articles shown in Table 6 show that citation frequency is an important indicator of presenting the specific scientific community's influence and attention. According to results and analysis, 233 articles

received more than 100 citations, and the top 15 focused articles are presented in Table 6. The most cited article, "Huang CL" (4913 citations) from Lancet Journal published in February 2020, defined clinical features of COVID-19. The article "Guan W.", published in April 2020, got the second position with 3163 citations from the New England Journal of Medicine, also relates clinical characteristics of Coronavirus. According to citation analysis and results, most citable articles belong to clinical features, aspects, infected patients, etc.

Table 6: Top 15 Highly Cited Articles on COVID-19 Research between January to August 2020

Rank	Author	Title	Source Journal	IF 2020	Citation Freq	Pub. Month
1	HUANG C L	Clinical features of patients of infected with 2019 novel coronavirus in Wuhan, China	LANCET	60.392	4913	Feb-20
2	GUAN W	Clinical characteristics of coronavirus disease 2019 in China	N. ENGL. J. MED.	37.910	3163	Apr-20
3	WANG DW	Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in, China	JAMA-J. AM. MED. ASSOC.	14.780	3029	Mar-20
4	ZHU N	A novel coronavirus from patients with pneumonia in China, 2019	N. ENGL. J. MED.	37.910	2651	Feb-20
5	CHEN NS	Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study	LANCET	60.392	2603	Feb-20
6	ZHOU F	Clinical course and risk factors for mortality of adult in patients with COVID-19 in Wuhan, China: a retrospective cohort study	LANCET	60.392	2432	Mar-20
7	ZHOU P	A pneumonia outbreak associated with a new coronavirus of probable bat origin	NATURE	42.778	1956	Mar-20
8	LI Q	Early transmission dynamics in Wuhan, China, of Novel coronavirus-infected pneumonia	N. ENGL. J. MED.	37.910	1759	Mar-20
9	LU RJ	Genomic characterisation and epidemiology of 2019 coronavirus: implications for virus origin and receptor binding	LANCET	60.392	1379	Feb-20
10	CHAN JFW	A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster	LANCET	60.392	1348	Feb-20
11	HOFFMANN M	SARS-COV-2 cell entry depends on ACE2 and TMPRSS2 and IS blocked by a clinically proven protease inhibitor	CELL	38.637	1218	Apr-20
12	XU	Pathological findings of COVID-19 associated with acute respiratory distress syndrome	LANCET RESP. MED.	15.780	1030	Apr-20
13	HOLSHUE ML	First case of 2019 of novel Coronavirus in the United States	N. ENGL. J. MED.	37.910	979	Mar-20
14	YANG XB	Clinical course and outcomes of critically ill patients with SARS-COV-2 pneumonia in Wuhan, China: a single-centered, retrospective, observational study	LANCET RESP. MED.	15.780	965	May-20
15	WU F	A new coronavirus associated with human respiratory disease in China	NATURE	42.778	849	Mar-20

CONCLUSION

In the current situation of the novel coronavirus COVID-19, we need to elaborate and understand subject experts' scientific efforts. The COVID-19 pandemic research focused on different aspects under health discipline like pandemic influenza, reverse genetics, swine influenza virus, h1n1 influenza, global virus, Zika virus, avian influenza, virus infection, influenza burden, etc. This present Scientometric study of COVID-19 focused on scientific communication using information visualization tools to recognize specific domain literature's progress. This study was conducted on COVID-19 publications published in Web of Science from January to August 2020 and analyzed obtained consider 7089 records were retrieved from WOS. The COVID-19 results

represent co-authorship collaboration networks of countries, institutions, and authors. The highly co-cited documents are Dawood F.S., sourced from New England journal, the most remarkable paper in COVID-19 research. Highly occurred countries are USA, England, and Peoples R China. Besides, COVID-19 research also focused on the WOS subject categories of Infectious Diseases, Immunology, and Virology. Influenza, infection and pandemic Influenza got the highest frequency, but in terms of citation bursts in the most recent years, Hong Kong, Human Immunodeficiency Virus, and Seasonal Influenza.

Additionally, the topics in the current issue of COVID-19 research, "pandemic influenza", "reverse genetics", and "avian influenza", are received by co-citation clusters analysis. This study also focused on highly cited sources. The Lancet journal is top-cited with 38 documents, followed by "New England Journal of Medicine" and "Journal of the American Medical Association".

In this research study, we conducted data mining with the Web of Science Analyse Results tool and identified 10255 records on COVID-19. This study presents a snapshot in time and can be used by future studies to investigate the relationship between research output and the pandemic's spread. We focused our analysis of scientific research records on identifying research relationships in journal citations, and we found an increased collaboration on COVID-19 research between the most affected countries.

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