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Mapping and Clustering analysis on Coronavirus literature in China: A Bibliometric analysis during 2011-2020

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Abstract:

The present study is first of its kind as it attempts to ascertain publications output on coronavirus as reflected in *Scopus* database from the Chinese perspective. The most productive contributors, institutions, journals and core subjects in coronavirus publications are identified in this study. The highly cited articles on coronavirus are also identified. The VOS-viewer software is used to identify the collaborative network of authors, countries and occurrence of keywords. During 2011-2020 a total of 1331 publications were published in this field. The highest number 190 publications were published in 2018. The most prolific contributor was Jiang, S. who contributed 63 Publications followed by Du, L. with 51 publications. Chinese Academy of Agricultural Sciences, Beijing was found to be highly contributing institution with 144 publications followed by Chinese Academy of Sciences with 143 publications. The Journal of Virology was most productive journal with 84 publications followed by Plos One with 55 publications. The United States was leading collaborative country in coronavirus research with 271 publications. Out of total publications, 1319 were produced by multiple authors while only 12 by single authors. The word "*non-human"* was found to be the most frequently used keyword in publications with 910 occurrences.

Keywords: Coronavirus; bibliometrics; Scopus; collaborative publications; China

1. INTRODUCTION

Bibliometric allows for the analysis of scientific literature by means of their bibliographic content (De Bellis, 2009; Rodrigues et al. 2014; Zhou et al. 2015). The term bibliometric was first introduced by Alan Pritchard (Pritchard, 1969). Bibliometric analysis helps in detecting prolific authors and institutions who are working in a specific area of research. The bibliometic also includes the analysis of research collaboration between authors, institutions and countries. It assists to identify the journals that make research visible within a particular research area (Wang et al. 2014; Ospina- Mateus et al., 2019). The quantitative study of scientific literature (year-wise

output, contributors, and citations) helps to identify the developments in specific research area (Li and Hale, 2016).

The application of visualization techniques to bibliometric facilitates for deep analysis of collaborative networks (authors, institutions and countries) and to find out the relationship between clusters which was difficult to analyze earlier (Cobo et al., 2011; Kocak et al., 2019).

The present study aims to provide a bibliometric overview of research in thefield of coronavirus in China during the period of 2011 to 2020. The bibliometric study will help in finding top contributors, journals, institutions and articles in coronavirus research in China. The study will also recognize types of research collaboration (single author and collaborative publications), international collaboration with china, subject area and form of publications. This bibliometric study will identify most used keywords in coronavirus research publications.

Coronavirus (CoV) are large family of viruses which can cause positive stranded RNA viruses and are the pathogens for emerging respiratory disease outbreaks around the globe. They have crown like appearance under an electron microscope[4].In recent past, two more corona viruses had spread epidemics in varied geographical regions namely, Severe Acute Respiratory Syndrome (SARS-CoV) and Middle East Respiratory Syndrome Corona virus (MERS - CoV) (Hossain, 2020).

SARS-CoV originated in China in 2002 which spread overseas in many countries including the United States, Thailand, Hong Kong, Taiwan, Singapore and Vietnam. In total 8096 people were found to be infected with this disease and 774 lost their lives. MERS-CoV originated in Saudi Arabia in 2012 and spread overseas in many countries of Asia, Africa, Europe and America. As a result of this outbreak, most of the cases occurred in Saudi Arabia, Qatar, United Arab Emirates, Oman, Bahrain, Kuwait, Iraq, Jordan, Syria, Lebanon, Palestine, and Egypt (Al-Osail and Al-Wazzah, 2017).

The recent origin of Novel Coronavirus in Wuhan, China since December 2019 has been drawing great attention around the globe (Chen et al., 2020) and infected disease has been named as Coronavirus disease 2019(Covid-19) by World Health Organization(WHO Report 22; 11 February 2020).

As on May 7, 2020, the total confirmed cases reported by provinces, cities and regions in China are recorded at 82885, with death of 4633 people. For rest of the world, laboratory confirmed COVID -19 cases are recorded at 3,740,066 with casualty of 260,451 people on same date (Worldometer, 2020).

2. LITERATURE ANALYSIS

Many researchers have done bibliometric analysis in different subject fields in recent years. There are so many studies available on biblimetrics but the important studies that are related to this research have been selected for review.

Zyoud (2016) analyzed 883 global research publications on Middle East respiratory syndrome coronavirus (MERS-CoV), obtained from SCOPUS database for the period of 2012-2015.The analysis found that these publications achieved a total of 8015 citations, with an average of 9.01 citations for each publication. It was seen that associated publications were originated from 92 countries. The United States was leading contributor in world in producing MERS-CoV publications. Zou et al. (2019) investigated the oncolytic viruses (OVs) publications data, obtained from Web of Science Core Collection for the period of 2000 to 2018. The positive growth was registered in the most number of years in research output on OVs. The United States was leading contributor in world in producing OVs publications. The study found that highly cited papers were published in journals in the field of nursing, medicine and general biology. Pouris and Ho (2016) analyzed research output on ebola virus, using Science Citation Index expanded, during the period of 1991-2013. It analyzes most productive countries, authors, institutions and top cited articles on Ebola virus. The analysis found that Journal of Virology, Journal of Infectious Diseases and Virology were the top productive journals in this area of research and States Army Medical Research Institutes of Infectious Diseases was most productive institute in this field.

Bansal (2019) analyzed the global research publications on Buruli ulcer, based on SCOPUS database for the period of 2000-2017. It analyzes growth rate of literature, most productive authors, form of publications, authorship pattern and highly cited papers in this field. It was seen that publications on Buruli ulcer registered negative growth rate in most number of years. The analysis found that majority of the publications (86.62%) were result of collaborative efforts. It

was observed that maximum numbers of articles on Buruli ulcer were published in PLoS Neglected Tropical Diseases and Portaels F. contributed maximum number of articles. Gupta et al. (2018) analyzed 1168 publications, indexed by SCOPUS database, during 2007-2016 to know the status of pancreatic cancer research in India. It was observed that average annual growth of Indian publications was 14.19% and global share 2.08%. The analysis found that maximum (70%) publications were related to medicine subject and top 20 journals contributed 27.79% of the total output during the period of study. The study found that only 26 articles got citations in the range of 101 to 4502. Narzary and Murugan (2018) examined the Indian research output on Colorectal Cancer, based on Web of Science database, for the period of 2005-2016. After data analysis it was found that there was increasing trend in publications on Colorectal Cancer and majority of them were in the form of articles. It has been observed that there is an increasing trend in international collaborative work and USA is primary collaborator with India at international level. Sanyal SN is most productive author contributor and Panjab University, Chandigarh has top place in producing the maximum number of publications. Gupta et al. (2017) investigated 2483 Indian publications on thyroid, over a period of 10 years (2007-2016), using SCOPUS database. It has been seen that India's share of internationally collaborative papers is 8.82%. The study analyzed and found that USA is leading contributor with India in producing thyroid research. The maximum publications were related to medicine subject (77.57%). It was found that only 13 Indian articles on thyroid research got citations in the range of 83 to 422.Naheem et al. (2017) investigated the research output on chronic liver disease in SAARC countries, over a period of 20 years (1996-2015), using SCOPUS database. A total number of 2312 publications were contributed by these countries, which is only 3.49% of global chronic liver disease output. India is most productive country among SAARC countries in terms of publications share, top authors and top institutions. The study recommended that there is need to increase research collaboration among SAARC countries. Gupta et al. (2011) analyzed Indian diabetes research output during 1999-2008, to identify its growth rate, global share and international collaboration share. The study also tries to identify the features of top productive institutions, authors, and highly-cited papers. The total research output of India and collaborative publications share was also compared with China, South Korea and Brazil.

Jhamb et al. (2019) examined the Indian geology research, over a period of 20 years (1998-2017), using Web of Science database to find out the collaboration patterns of Indian geologists

and impact of their publications. It was observed that 55.4% publications were collaborated at national level while 34.3% were internationally collaborated. The analysis revealed that USA is primary collaborator at international level with 56 papers. It has been seen that articles published in the journal Geology got maximum citations per paper. Jabeen et al. (2017) analyzed 564 articles, indexed by Social Science Citation (SSCI), during 2012-2013 to identify the current status of library and information science research from Chinese perspective. The study analyzed and found that Chinese research community is focusing on international research collaboration to establish their existence at international level. It was observed that USA, UK and Belgium were primary research collaborators at international level and Chinese researchers were not much interested in conducting research on inter-institutional and on inter-regional level. The analysis revealed that Wuhan University and City University Hong Kong were leading institutes in China for producing LIS research. Dhawan et al. (2017) examined the 9858 global research output on metamaterials, for the period of 2007-2016, based on SCOPUS database. The top most productive countries were producing 84.97% of global share in publications on metamaterials and China was producing maximum global share. The maximum publications were related to physics and astronomy subject. The analysis revealed that 52 highly cited articles involved 142 organizations and 310 authors.

3. OBJECTIVES OF THE STUDY

The following objectives were framed for the study:

1. To find out the year-wise growth rate of coronavirus research publications, most productive contributors, institutions, and journals.
2. To identify the core subject categories, form of publications, most cited works and commonly used keywords.
3. To assess the collaborative network of authors and countries on coronavirus research.

4. METHDOLOGY

The data for this study was retrieved from *Scopus* (http://www.scopus.com) online bibliographic database, which is product of Elsevier. The following search string was used on 15/02/2020 for collecting data from Scopus.

TITLE-ABS-KEY (coronavirus) AND (LIMIT-TO (AFFILCOUNTRY, "China")) AND (LIMIT-TO (PUBYEAR, 2020 to 2011))).

As a result of this search string 1331 publications were retrieved for the marked period of study (2011- 2020). Out of 1331 publications, 738 were openly accessed while 593 were having other type of access (Table 1). The results were exported to excel format under the headings such as title of the documents, author, year, citations, sources, affiliation and document type etc. The VOS-viewer software (www.vosviewer.com) was used to identify the collaborative network of authors, countries and occurrence of keywords. The study used the Scimago Institutions Ranking (www. scimagojr.com) to identify the h- index of the journals.

Table 1: Access Type to Publications

Access Type	**No. of Publications**
Open Access	738
Other	593
Total	**1331**

5. LIMITATIONS OF THE STUDY

1. The bibliographic data for this paper was taken from Scopus database only. There is no database that covers all the publications on coronavirus published in China.
2. The real situation of quality papers in the field may be different from this bibliographic study as some high quality recently published papers may have less number of citations.
3. The high number of publications (1258) is written in English language only. So, some quality publications written in Chinese language might be missed.

6. RESULTS

6.1 Growth rate of Publications

Table 2 depicts the year wise growth rate of the publications on coronavirus during the period of study i.e. (2011-2020). It is seen in table that there is fluctuating growth of publications. It reveals that during the period of study, a total of 1331 publications were published. The highest 190 (14.27%) publications were published in 2018. The lowest number of publications

87(6.54%) were published in 2011. In 2020 till 15/2/2020, 42 publications were recorded on coronavirus research in China.

Table 2: Growth rate of Publications

Year	No. of Publications	% of Publications	Cumulative %
2011	87	6.54	6.54
2012	91	6.84	13.38
2013	123	9.24	22.62
2014	110	8.26	30.88
2015	175	13.15	44.03
2016	173	13	57.03
2017	166	12.47	69.5
2018	190	14.27	83.77
2019	174	13.07	96.84
2020 (15/2/2020)	42	3.16	100
Total	**1331**	**100**	

6.2 Top 10 Leading Contributor on Coronavirus Research in China

A total of 3294 authors contributed in total output (1331 publications) on coronavirus during the period under study. The top 10 leading contributors, along with number of publications, percentages of total output and affiliation of the contributors were identified (Table 3). In this list, Jiang, S. of Fudan University, Shanghai has contributed highest 63 publications. Findings revealed that Du, L. has contributed second highest publications (51), followed by Tan, W (40), Yuen, K.Y.(40) and Xiao, S(36). The overall data of top 10 contributors is shown in Table 3 below.

Table 3: Top 10 Leading Contributor on Coronavirus Research in China (2011-2020)

Name of the Contributor	No. of Publications	% of 1331	Rank	Institute(s) of the Contributor
Jiang, S.	63	4.73	1	Fudan University, Shanghai
Du, L.	51	3.83	2	Nanjing Normal University, Nanjing
Tan, W.	40	3.01	3	Chinese Centre for Disease Control and Prevention, Beijing National Institute for Viral Disease Control and Prevention, Beijing

				Chinese Academy of Sciences, Beijing
Yuen, K.Y.	40	3.01	4	Shenzhen Hospital, Shenzhen
Xiao, S.	36	2.70	5	Huazhong Agricultural University, Wuhan
Fang, L.	34	2.55	6	Huazhong Agricultural University, Wuhan
Feng, L.	34	2.55	7	Chinese Academy of Agricultural Sciences, Beijing Heilongjiang Academy of Agricultural Sciences, Harbin National Key Laboratory of Veterinary Biotechnology, Harbin
Liu, S.	32	2.40	8	The Chinese Academy of Agricultural Sciences, Harbin Gansu Agricultural University, Lanzhou Northeast Agricultural University, Harbin
Han, Z.	31	2.33	9	The Chinese Academy of Agricultural Sciences, Harbin
Lu, L.	28	2.10	10	Fudan University, Shanghai

6.3 Top 10 leading Institutes on Coronavirus Research in China

A total number of 3264 institutes participated for the publication of 1331documents. The top 10 leading institutes are presented in the Table 4. The results revealed that Chinese Academy of Agricultural Sciences, Beijing and Chinese Academy of Sciences, Beijing are leading institutes in coronavirus research publications in China. These two leading institutes produced more than 21% of total research output during the marked period. Fudan University, Shanghai with 89 publications, Institute of Microbiology, Beijing with 81 publications, Chinese Centre for Disease Control and Prevention, Beijing with 77 publications and Shanghai Medical College, Shanghai with 70 publications is among the top leading institutes in coronavirus research in China. The overall data of top 10 leading institutes is shown in below Table 4.

Table 4: Top 10 leading Institutes on Coronavirus Research in China (2011-2020)

Name of the Institute	No. of Publications	% of 1331	Rank	Region
Chinese Academy of Agricultural Sciences	144	10.82	1	Beijing
Chinese Academy of Sciences	143	10.74	2	Beijing
Fudan University	89	6.69	3	Shanghai
The University of Hong Kong	85	6.39	4	Hong Kong
Institute of Microbiology	81	6.09	5	Beijing
Chinese Center for Disease Control and Prevention	77	5.79	6	Beijing
Shanghai Medical College	70	5.26	7	Shanghai
Huazhong Agricultural University	69	5.18	8	Wuhan
Ministry of Education China	66	4.96	9	Beijing
Chinese Academy of Medical Sciences	63	4.73	10	Beijing

6.4 Top 10 Most Productive Journals on Coronavirus Research

A total number of 346 sources contributed in research output i.e. 1331 publications during the period under study. The top 10 journals in coronavirus research along with number of articles, percentages of total output, total number of citations and H index of these journals were identified (Table 5). It was seen that Journal of Virology was most productive source with 84 publications, 6.31% of total output, 2809 citations and 271 H Index. Plos One was second most productive source with 55 publications, 4.13% of total output, 1139 citations and 268 H Index followed by Viruses with 48 publications, 3.61% of total output, 351 citations and 59 H Index. The overall data of top 10 leading journals is shown in below Table 5.

Table 5: Top 10 Most Productive Journals on Coronavirus Research (2011-2020)

Source Title	No. of Articles	% of 1331	Citations	Rank	H Index
Journal Of Virology	84	6.31	2809	1	271
Plos One	55	4.13	1139	2	268
Viruses	48	3.61	351	3	59
Archives Of Virology	43	3.23	402	4	102
Veterinary	42	3.16	443	5	114

Microbiology					
Virology	38	2.86	377	6	162
Virus Research	37	2.78	460	7	104
Virologica Sinica	34	2.55	190	8	20
Virology Journal	29	2.18	433	9	70
Antiviral Research	22	1.65	295	10	108

6.5 Top 10 leading Subject Area of Publications on Coronavirus in China

Table 6 lists the leading subject area of publications in coronavirus research in China during the period of study. The maximum publications 758 (56.95%) were related to Immunology and Microbiology subject. The 523(39.29%) publications were contributed by Medicine subject. Biochemistry, Genetics and Molecular Biology subject got 3rd rank with 432 (32.46%) publications. The overall data of top 10 leading area of publication is shown in below Table 6.

Table 6: Top 10 leading Subject Area of Coronavirus Research Publications in China (2011-2020)

Subject	No. of Publications	Percentage	Rank
Immunology and Microbiology	758	56.95	1
Medicine	523	39.29	2
Biochemistry, Genetics and Molecular Biology	432	32.46	3
Agricultural and Biological Sciences	206	15.48	4
Veterinary	144	10.82	5
Pharmacology, Toxicology and Pharmaceutics	112	8.41	6
Multidisciplinary	88	6.61	7
Chemistry	38	2.86	8
Environmental Science	25	1.88	9
Physics and Astronomy	18	1.35	10

6.6 Form of Publications

The Table 7reveals the form of publications on coronavirus research in China during the marked period of study. The maximum publications were in the form of articles 1117(83.92%), followed by reviews 105(7.89%) and letters 55 (4.13%). The whole data for all publications form is shown in Table 7.

Table 7: Form of Publications

Form of Publication	No. of Publications	% of 1331	Rank
Article	1117	83.92	1
Review	105	7.89	2
Letter	55	4.13	3
Editorial	17	1.28	4
Note	13	0.98	5
Short Survey	9	0.68	6
Conference Paper	7	0.53	7
Book Chapter	6	0.45	8
Erratum	2	0.15	9

6.7 Collaborative Network of Authors

Figure1illustrates the collaborative network of authors on coronavirus research. In this VOS-viewer map, 6 clusters are identified which indicate that they have strong commitment to do collaborative research in this field. Cluster marked with red color is largest cluster as compared to other 5 clusters. This cluster is network of 20 researchers who are doing collaborative research.

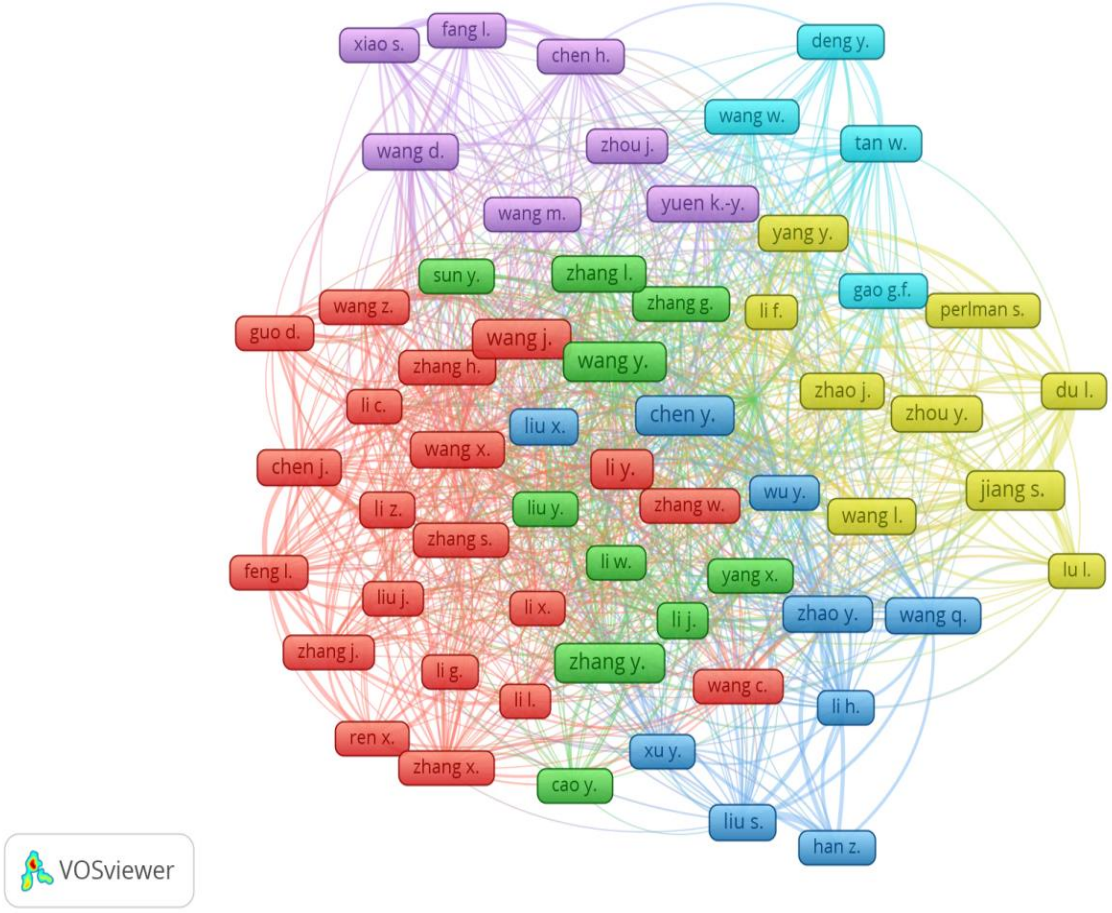

Figure 1: Collaborative Network of Authors

Cluster marked with green colour is second largest cluster that have 10 researchers who have strong association with each other to undertake collaborative work. Cluster marked with yellow colour having 9 people and in this cluster, Jiang, S (Fudan University) has strong connection with Du, L (Nanjing Normal University) and Lu, L (Fudan University) of China.

6.8 Network of Collaborative Countries on Coronavirus Publications with China

According to countries collaboration, United States is leading collaborative country in coronavirus publications with China during the period of study. The United States produced 20.36% of publications (n=271/1331) with China. Scopus data revealed, Hong Kong as a separate country, is second leading collaborator with China. Hong Kong produced 5.48% of publications (n=73/1331) with China. United Kingdom, Singapore, Germany, Australia, Canada,

Thailand, Netherland and France are in the list of top 10 leading collaborator with China during the marked period (Table 8).

Table 8: Top 10 Leading Collaborative Countries on Coronavirus Publications with China (2011-2020)

Country	No. of Articles	% of 1331	Rank
United States	271	20.36	1
Hong Kong	73	5.48	2
United Kingdom	35	2.63	3
Singapore	34	2.55	4
Germany	33	2.48	5
Australia	25	1.88	6
Canada	20	1.50	7
Thailand	19	1.43	8
Netherlands	17	1.28	9
France	15	1.13	10

The network of collaborative countries was developed by using VOS-viewer software. The map of networks indicates countries with 4 or more than 4 collaborative publications with China (Figure 2).

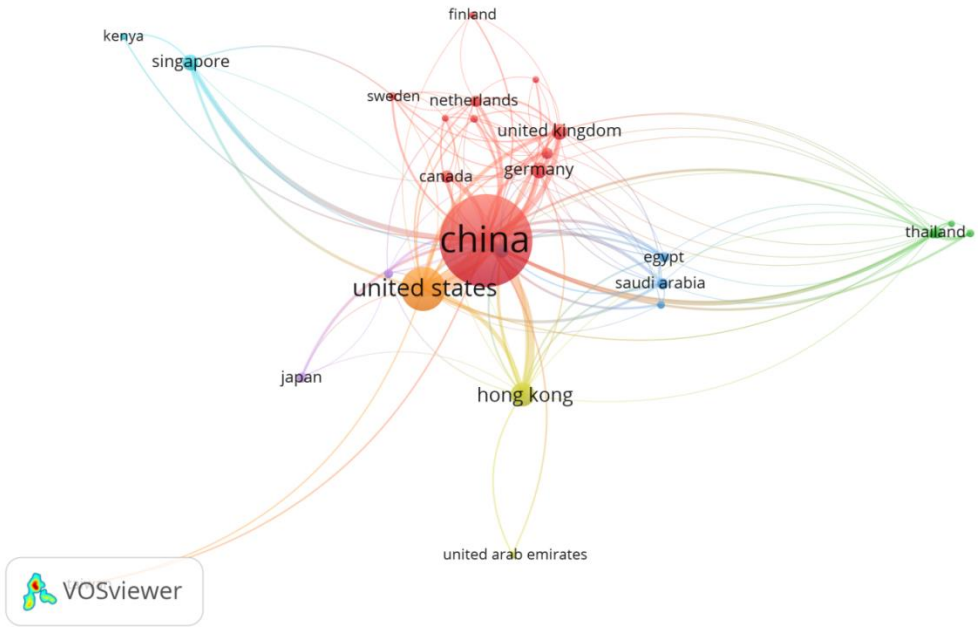

Figure 2: Network of collaborative countries on coronavirus research with China

6.9 Collaborative Type of Coronavirus Research

Single author research is not popular in this area, maximum publications are result of collaborative efforts. Table 9 illustrates that out of total publications (1331) on coronavirus in China during the period under study, 1319(99.10%) were result of collaborative efforts and only 12(0.90%) publications were produced by single author.

Table 9: Collaborative Type of Coronavirus Research (2011-2020)

Collaborative	Single Author Publications	Collaborative Publications	Total
No. of Articles	12	1319	1331
Percentage	0.90	99.10	100

6.10 Keywords Analysis in Coronavirus Research

The analysis of keywords of publications portrays research topics and trends in this field. Analysis of keywords was done by using VOS-viewer software by considering the keywords in article title, abstract and keywords. A total number of 8712 keywords were used in 1331 publications. The keywords occurring in minimum 60 publications were taken and 151 terms were selected for inclusion in network of keywords. Figure 3 revealed the VOS-viewer analysis of keywords. Analysis was divided into five clusters. Size of the circles show the frequency of occurrence of terms and distance between these terms on VOS-viewer map reveals the relationship between these keywords.

Table 10reveals 20 most frequently used keywords in coronavirus publications. Word *non-human* was most used keyword in publications (910 occurrences), followed by Articles (906 occurrences), Animals (794 occurrences), Animal (656 occurrences), Controlled study (604 occurrences), Virology (590 occurrences), Coronavirus infections (575 occurrences), Human (569 occurrences) and Genetics (523 occurrences).The overall data of 20 most frequently used keywords is shown in below Table 10.

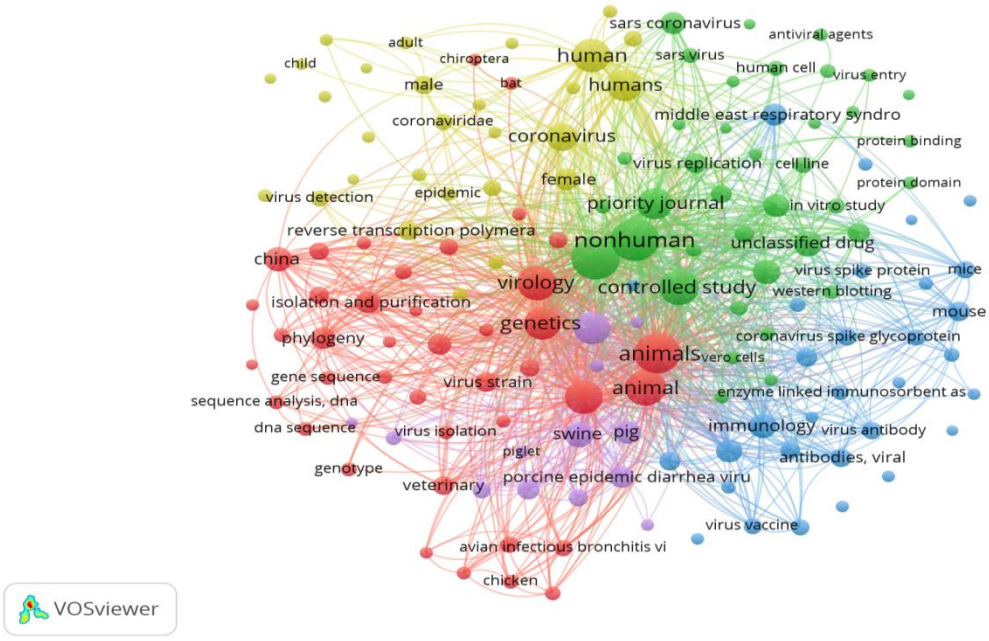

Figure 3: Keywords Analysis in Coronavirus Research Publications

Table 10: 20 Most Frequently Used Keywords in Coronavirus Publications in China (2011-2020)

Keywords	Occurrences	Rank	Keywords	Occurrences	Rank
Non-human	910	1	Humans	499	11
Articles	906	2	Priority journal	497	12
Animals	794	3	Coronavirus	385	13
Animal	656	4	Unclassified drug	325	14
Controlled study	604	5	Swine	320	15
Virology	590	6	China	307	16
Coronavirus infections	575	7	Animal Cell	287	17
Human	569	8	Metabolism	280	18
Genetics	523	9	Animal experiment	271	19
Coronavirus infection	521	10	Pig	267	20

6.11 Top 10 Cited Articles on Coronavirus

Table 11 presents the most cited articles on coronavirus. The first rank of highly cited paper in coronavirus research is assigned to "Discovery of seven novel mammalian and avian coronaviruses in the genus Deltacoronavirus supports bat coronaviruses as the gene source of Alphacoronavirus and Betacoronavirus and avian coronaviruses as the gene source of Gammacoronavirus and Deltacoronavirus" with 327 citations. This work was published in 2012 and it was collaborative efforts of 14 contributors (Woo P.C.Y., Lau S.K.P., Lam C.S.F., Lau C.C.Y., Tsang A.K.L., Lau J.H.N., Bai R., Teng J.L.L., Tsang C.C.C., Wang M., Zheng B.-J., Chan K.-H., and Yuen K.-Y.). The second rank of highly cited paper is assigned to "Isolation and characterization of a bat SARS-like coronavirus that uses the ACE2 receptor" (2013) with 288 citations. 20 authors contributed to produce this work (Ge X.-Y., Li J.-L., Yang X.-L., Chmura A.A., Zhu G., Epstein J.H., Mazet J.K., Hu B., Zhang W., Peng C., Zhang Y.-J., Luo C.-M., Tan B., Wang N., Zhu Y., Crameri G., Zhang S.-Y., Wang L.-F., Daszak P., Shi Z.-L.). The overall data for 10 most cited articles is presented in below Table 11.

Table 11: Top 10 Cited Articles on Coronavirus

Title of the Article	**Year of Publication**	**No. of Citations**	**Rank**
Discovery of seven novel mammalian and avian coronaviruses in the genus Deltacoronavirus supports bat coronaviruses as the gene source of Alphacoronavirus and Betacoronavirus and avian coronaviruses as the gene source of Gammacoronavirus and Deltacoronavirus	2012	327	1
Isolation and characterization of a bat SARS-like coronavirus that uses the ACE2 receptor	2013	288	2
Origin, evolution, and genotyping of emergent porcine epidemic diarrhea virus strains in the united states	2013	244	3
Molecular basis of binding between novel human coronavirus MERS-CoV and its receptor CD26	2013	240	4
Outbreak of porcine epidemic diarrhea in suckling piglets, China	2012	205	5
Seroepidemiology for MERS coronavirus using microneutralisation and pseudoparticle virus neutralisation assays reveal a high prevalence of antibody in dromedary camels in Egypt, june 2013	2013	201	6

New variants of porcine epidemic diarrhea virus, China, 2011	2012	190	7
The fecal virome of pigs on a high-density farm	2011	189	8
Structure of MERS-CoV spike receptor-binding domain complexed with human receptor DPP4	2013	177	9
Virome analysis for identification of novel mammalian viruses in bat species from chinese provinces	2012	150	10

7. CONCLUSION

We can conclude that the purpose of this study is to scan the mapping and clustering analysis of coronavirus literature in China. A total of 1331 publications were published on coronavirus during 2011-2020 as indexed in SCOPUS database. During this period the average growth rate was recorded 133.1 publications per year. The maximum publications (190) were recorded in 2018 and minimum publications (87) were recorded in 2011.The top ten authors contributed 31.91% publications during the period of the study. Jiang, S from Fudan University, Shanghai grabbed first rank by contributing 63 publications. This study found that top ten institutes produced 66.65% publications. The Chinese Academy of Agricultural Sciences, Beijing grabbed first rank with 144(10.82%) publications. The top ten journals contributed 32.46% publications. The Journals of Virology grabbed first rank by contributing 84 papers with 2809 citations. The maximum publications 758(56.95%) were related to immunology and microbiology subject, followed by medicine with 523 (39.29%) publications. It was found that the maximum 1117 (83.92%) publications were articles type of documents. The analysis revealed that United States is leading collaborator in producing coronavirus publications with China. The single author research is not popular in this area of research as maximum publications were results of collaborative efforts, out of 1331; only 12 publications were produced by single authors. The keyword non-human grabbed first rank with 910 occurrences, followed by articles (906), animals (794), animal (656), controlled study (604), virology (590), coronavirus infections (575) human (569) and genetics (523).The top 10 cited articles on coronavirus got 2211 citations. The maximum cited article on coronavirus research is “Discovery of seven novel mammalian and avian coronaviruses in the genus Deltacoronavirus supports bat coronaviruses as the gene source of Alphacoronavirus and Betacoronavirus and avian coronaviruses as the gene source of Gammacoronavirus and Deltacoronavirus” with 327 citations.

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