

Corona Virus Research in Veterinary Science a Scientometrics Analysis

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***Abstract-**The present study explores the research output on corona virus in the different disciplines of veterinary science during 1989 to 2020 and Web of Science citation database used for this work. Results show that 1901 documents published in the study period and 6118 scientists/researchers published their research in this field. The present study was focused to analyses the collected data for year-wise output, source-wise, topmost journals, topmost author wise, institution wise, and keyword most occurrence in the research. Also, the present study reveals the interpretation of various citation scores in the scientometric aspects. In conclusion, the corona virus research output by Indian researchers for veterinary science was evidenced by the contribution of 158 research documents with Global Citation Scores of 1418 and Global Citation Score of 132. The quality research in all aspects of information would help in improving the productivity and also have a research impact.*

Keywords: Scientometric Study, Corona Virus, Veterinary Science, Vaccines, Science Database, International Nuclear Information System Database (INIS).

Introduction

Recently, the corona virus is causing the most predominant diseases in the world. Most of the human beings and animals mostly infected by these viruses. Several researchers are working in different countries for complete eradication of these viral diseases from this world. Due to the pandemic situation, research is mainly focused on development of vaccines for human beings. However, the corona virus research in the veterinary discipline is also done by scientists and published their experimental results. Therefore, the present study is focused on veterinary science research with exclusive work on corona virus and data collected from the web of science database. One of the ways to analyses the quality of paper is its impact on the research. Scientometrics is used to determine the impact of research. For this study, the impact of corona virus research output published by Indian researchers at the national level as well as the international level was analyzed and reported.

Review of Related Literature

Kademani et al. (2006) analyzed the scientometric respect in nuclear science and technology research in India using International Nuclear Information System database (INIS) for a selective period (1970-2002). It is found that the average number of papers published per year was

1676.15. Most of the scientists published in the journals (60%) (Sankar, M & Srinivasaragavan 2012). The most preferred Journal was Pramana 1327 (3.955%), and more than 99 percent written in English. Sankar and Srinivasaragavan carry out a scientometric study for authorship collaboration in agricultural research during 1970 – 2012, and the results showed a low level of publication in India as compared to the global level. Deals with sources authorship and metric related information also found in the result. It is also applied simple statistics and levels of local citation scores and global citation scores in the research.

Objectives of the study

1. To identify the year-wise distribution of output for corona virus research in veterinary science for India.
2. To identify the source-wise distribution for corona virus research in veterinary science for India.
3. To identify the topmost journal distribution in corona virus research output by Indian researchers.
4. To identify the topmost author-wise distribution for Indian researchers worked in the corona virus research in veterinary science.
5. To identify the frequency of institution-wise for corona virus research carried out in veterinary research field by Indian scientists.
6. To identify the frequency of keyword for corona virus research work found in Indian veterinary science researchers.

Methodology

The Web of Science (WoS) database is gaining more popular in India, which is a very user-friendly citation database as compared with other databases. The Web of knowledge is the search platform provided by Thomson Reuters (Kademani et al. 2006). For this study, the WoS online database was used to data collection on corona virus research done in the area of veterinary science by Indian researchers and used for further analysis (Shri Ram 2020). The period of study was chosen from January 1989 to 2020 September, and data collection restricted to this period only. The search string is the "corona virus" was used in WoS database and results showed 1901 records. The data was downloaded in the R-Programming software (Biblioshiny tool) and analyzed according to the objectives of the study in Table 1.

Table 1: Basic Data of Corona Virus Research Output for Published by India Veterinary Scientists during 1989-2020

S. No	Description	Results
1	Documents	1901
2	Sources (Journals, Books, etc.)	151
3	Keywords plus (ID)	2920
4	Author's keywords (DE)	2604
5	Average citations per documents	17.21
6	Authors	6118
7	Author appearances	9641
8	Authors of single-authored documents	119
9	Authors of multi-authored documents	5999
10	Single-authored documents	164

11	Documents per author	0.311
12	Authors per document	3.22
13	Co-authors per documents	5.07
14	Collaboration Index	3.45

Data analysis and interpretation

The impact of specific area of research can be assessed by counting the number of research documents published in that field, citation scores and scholar indices. Table 1 gives the details about year wise research documents and means value of total citation article scores and total citations per year scores for corona virus research works done by India veterinary scientists during 1989-2020. (Farshid Danesh & Somayeh Ghavi Del 2020) the study results reveals that articles published 55 numbers in 2006 and Mean TC per Art 30.58181818, Mean TC per Year 2.184415584 the citable year is 14. The maximum and minimum number of research documents found as 108 and 14 for 2020 and 2004, respectively. (Siva Sami, K. 2016) More than 20 records found as a yearly research output in corona virus research in veterinary science in India. Furthermore, it was found those citable years in Table 2.

Table 2: Year Wise Documents with Citation of Corona Virus Research in Veterinary Science

S.no	Year	Article	Mean TC per art	Mean TC per year	Citable years
1	1989	26	15.38461538	0.496277916	31
2	1990	32	15.2812500	0.50937500	30
3	1991	51	17.68627451	0.609871535	29
4	1992	49	26.53061224	0.947521866	28
5	1993	62	25.74193548	0.953405018	27
6	1994	41	16.31707317	0.627579737	26
7	1995	53	19.20754717	0.768301887	25
8	1996	45	20.86666667	0.869444444	24
9	1997	56	22.71428571	0.98757764	23
10	1998	37	24.94594595	1.133906634	22
11	1999	51	23.54901961	1.121381886	21
12	2000	53	28.56603774	1.428301887	20
13	2001	61	23.98360656	1.262295082	19
14	2002	48	25.91666667	1.439814815	18
15	2003	43	21.81395349	1.283173735	17
16	2004	51	24.25490196	1.515931373	16
17	2005	46	26.36956522	1.757971014	15
18	2006	55	30.58181818	2.184415584	14
19	2007	70	27.27142857	2.097802198	13
20	2008	64	22.90625000	1.908854167	12
21	2009	58	18.70689655	1.700626959	11
22	2010	59	17.57627119	1.757627119	10
23	2011	46	15.73913043	1.748792271	9
24	2012	67	16.14925373	2.018656716	8
25	2013	71	15.8028169	2.257545272	7
26	2014	97	13.74226804	2.290378007	6

27	2015	88	12.94318182	2.588636364	5
28	2016	102	7.901960784	1.975490196	4
29	2017	105	6.171428571	2.057142857	3
30	2018	92	2.739130435	1.369565217	2
31	2019	108	0.962962963	0.962962963	1
32	2020	14	0.214285714	0	0

Generally, several numbers of scholar indices (h, g and m index of the author) used to measure the bibliometric impact of individual scientist or researcher. The results reveals that the author SAIF LJ holds first place (h index of 28, g index of 39 and 0.875)by contributing 62 papers with 1812 citations in Table 3.

Table 3: Author Wise H-Index, G-Index-Index of Corona Virus Research in Veterinary Science (Top 20)

S.no	Author	H_index	G_index	M_index	TC	NP	PY_start
1	Saif Lj	28	39	0.875	1812	62	1989
2	Paltrinieri S	15	22	0.535714286	533	32	1993
3	Decaro N	15	25	0.789473684	644	28	2002
4	Addie Dd	15	25	0.483870968	643	26	1990
5	Buonavoglia C	17	26	0.772727273	807	26	1999
6	Hartmann K	12	22	0	497	26	0
7	Pedersen Nc	17	25	0.653846154	1028	25	1995
8	Jackwood Mw	16	24	0.571428571	980	24	1993
9	Cavanagh D	16	20	0.551724138	1650	20	1992
10	Lutz H	14	19	0.451612903	569	19	1990
11	Martella V	12	18	0.6	537	18	2001
12	Giordano A	9	15	0.473684211	243	17	2002
13	Hohdatsu T	9	17	0.3	352	17	1991
14	Liu Sw	12	17	0.705882353	417	17	2004
15	Mari V	12	17	0.857142857	357	17	2007
16	Mostl K	6	12	0.187500000	150	17	1989
17	Toro H	9	14	0.6	215	17	2006
18	Han Zx	11	16	0.733333333	295	16	2006
19	Brandao Pe	6	11	0.428571429	127	15	2007
20	Elia G	12	15	0.6	399	15	2001

The highest research documents were published as 108 in 2019, followed by 2017 (n=105) and 2016 (n=102). It was observed that the number of published documents was found higher for 2013-2019 that of previous years. However, lesser number of publications found 2020 was due to data collected for nine months in 2020 in Table 4.

Table 4: Individual Authors-Frequency Year Wise (Top 15)

S.no	Author	year	freq	TC	TCpY
1	Addie dd	1990	1	15	0.483870968
2	Addie dd	1992	2	139	4.793103448
3	Addie dd	1993	1	4	0.142857143

4	Addie dd	1994	1	0	0
5	Addie dd	1995	3	83	3.192307692
6	Addie dd	1996	1	18	0.72
7	Addie dd	1997	1	80	3.333333333
8	Addie dd	1998	1	18	0.782608696
9	Addie dd	2000	2	64	3.047619048
10	Addie dd	2001	1	55	2.75
11	Addie dd	2002	1	44	2.315789474
12	Addie dd	2004	5	77	4.529411765
13	Addie dd	2005	1	18	1.125
14	Addie dd	2012	1	6	0.666666667
15	Addie dd	2013	1	9	1.125

The second place lotka’s law-author productivity for paltrinieri s (h index of 15, g index of 22 and 0.535714286) for his 32 research papers, which was cited by 533 documents. The author, Kumar S ranked third place with a research output of 28 papers with 644 citations (h index 15.g index 25 and 0.789473684) in Table 5.

Table 5: Lotka’s Law-Author Productivity

Documents	No. of authors	Proportion of authors
1	4633	0.757273619
2	844	0.13795358
3	268	0.043805165
4	142	0.023210199
5	73	0.011932004
6	42	0.006864989
7	26	0.004249755
8	25	0.004086303
9	13	0.002124877
10	10	0.001634521
11	8	0.001307617
12	4	0.000653808
13	2	0.000326904
14	3	0.000490356
15	7	0.001144165
16	1	0.000163452
17	6	0.000980713
18	1	0.000163452
19	1	0.000163452
20	1	0.000163452
24	1	0.000163452
25	2	0.000326904
26	2	0.000326904
28	1	0.000163452
29	1	0.000163452
30	1	0.000163452

Bradford's law applied corona virus research in veterinary science predicts that the number of alternate and third zones will be n and n^2 times larger than the first zone independently and thus, it should be possible to prognosticate the total number of papers on a subject once the number in the core and middle zone in Table 6.

Table 6: Bradford Law Applied Corona Virus Research in Veterinary Science

S.no	Source	Rank	Freq	cumFreq	Zone
1	Veterinary Microbiology	1	191	191	Zone 1
2	AVIAN Diseases	2	115	306	Zone 1
3	Journal of Veterinary Medical Science	3	85	391	Zone 1
4	Journal of Veterinary Diagnostic Investigation	4	83	474	Zone 1
5	AVIAN Pathology	5	73	547	Zone 1
6	Veterinary Record	6	67	614	Zone 1
7	Journal of Feline Medicine And Surgery	7	64	678	Zone 1
8	Journal of Wildlife Diseases	8	51	729	Zone 2
9	American Journal of Veterinary Research	9	49	778	Zone 2
10	Transboundary and Emerging Diseases	10	44	822	Zone 2
11	Veterinary Immunology and Immunopathology	11	44	866	Zone 2
12	Veterinary Journal	12	42	908	Zone 2
13	Bmc Veterinary Research	13	41	949	Zone 2
14	Veterinary Research	14	41	990	Zone 2
15	Research in Veterinary Science	15	38	1028	Zone 2
16	Canadian Journal of Veterinary Research-Revue Canadienne De Recherche Veterinaire	16	30	1058	Zone 2
17	Laboratory Animal Science	17	29	1087	Zone 2
18	Preventive Veterinary Medicine	18	28	1115	Zone 2
19	Veterinary Pathology	19	25	1140	Zone 2
20	Zoonoses And Public Health	20	23	1163	Zone 2
21	Journal Of Comparative Pathology	21	22	1185	Zone
22	Journal of Veterinary Internal Medicine	22	22	1207	Zone 2
23	Magyar Allatorvosok Lapja	23	22	1229	Zone 2
24	Acta Veterinaria Hungarica	24	21	1250	Zone 2
25	Canadian Veterinary Journal-Revue Veterinaire Canadienne	25	21	1271	Zone 2
26	Feline Practice	26	19	1290	Zone 2
27	Acta Veterinaria Scandinavica	27	17	1307	Zone 3
28	Journal of Veterinary Medicine Series B-Infectious Diseases And Veterinary Public Health	28	17	1324	Zone 3
29	Australian Veterinary Journal	29	16	1340	Zone 3
30	Revue Scientifique Et Technique-Office International Des Epizooties	30	16	1356	Zone 3

Bradford law zone wise source and records have veterinary microbiology AVIAN diseases journal of veterinary medical science and AVIAN pathology in Table 7 and Figure 1.

Table 7: Bradford Law Zone Wise Source and Records

Zone	Source	Records
I (Core)	7	678
II	19	612
III	125	611

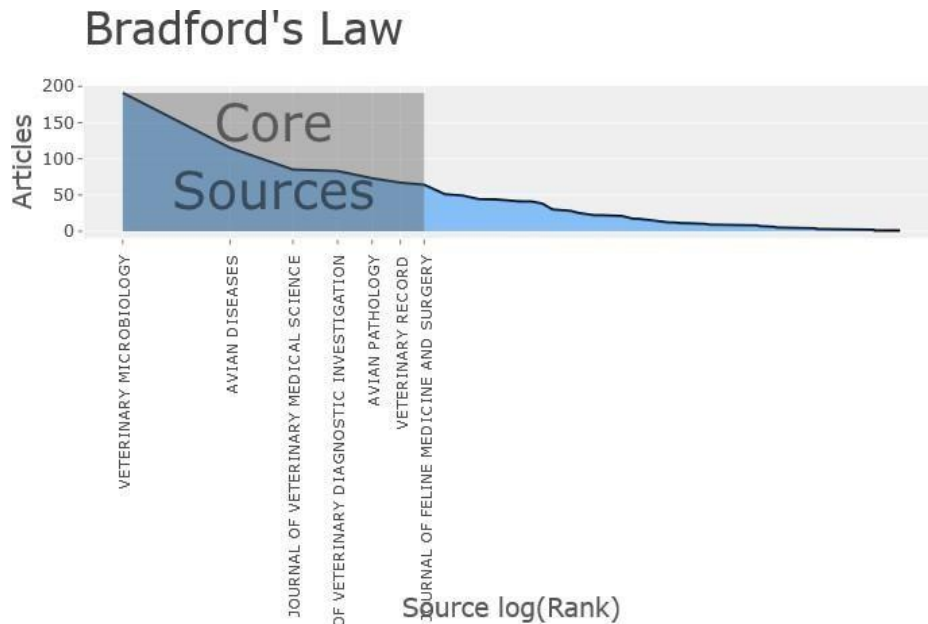


Figure-1: Bradford Law Zone Wise Source and Records

First rank for Veterinary Microbiology journal is the highly productive journal with h index 34, g index 47 and 191 publications and recorded 3910 Citations, followed by AVIAN DISEASES journal (hindex 29, g index 47 and 115 publications and 2789 Citations). Third rank reserved for journal of veterinary medical science due to its hindex of 17, g index of 27, 85 publications with 990 Citations in Table 8 and Figure 2.

Table 8: Source Dynamics of Corona Virus Research in Veterinary Science

Year	Veterinary microbiology	Journal of veterinary medical science	AVIAN pathology	Journal of veterinary diagnostic investigation	AVIAN diseases
1989	7	0	0	0	0
1990	3	0	0	0	2
1991	6	4	0	2	2
1992	5	4	2	1	2
1993	5	4	0	2	1
1994	5	2	0	1	1
1995	4	3	2	3	0
1996	2	4	3	4	0
1997	2	3	3	1	6
1998	3	2	0	2	3
1999	4	3	0	6	0
2000	2	2	2	2	11
2001	2	3	4	2	11
2002	2	0	2	7	8

2003	5	1	3	4	6
2004	3	4	2	1	2
2005	3	1	3	3	3
2006	1	1	7	2	3
2007	11	4	6	2	5
2008	9	5	4	2	3
2009	6	4	3	2	3
2010	8	2	2	4	4
2011	6	2	4	3	2
2012	6	1	2	4	6
2013	11	3	3	2	5
2014	9	2	3	5	4
2015	11	0	2	4	5
2016	13	7	2	3	7
2017	16	5	4	3	5
2018	4	4	3	4	3
2019	14	5	2	2	2
2020	3	0	0	0	0

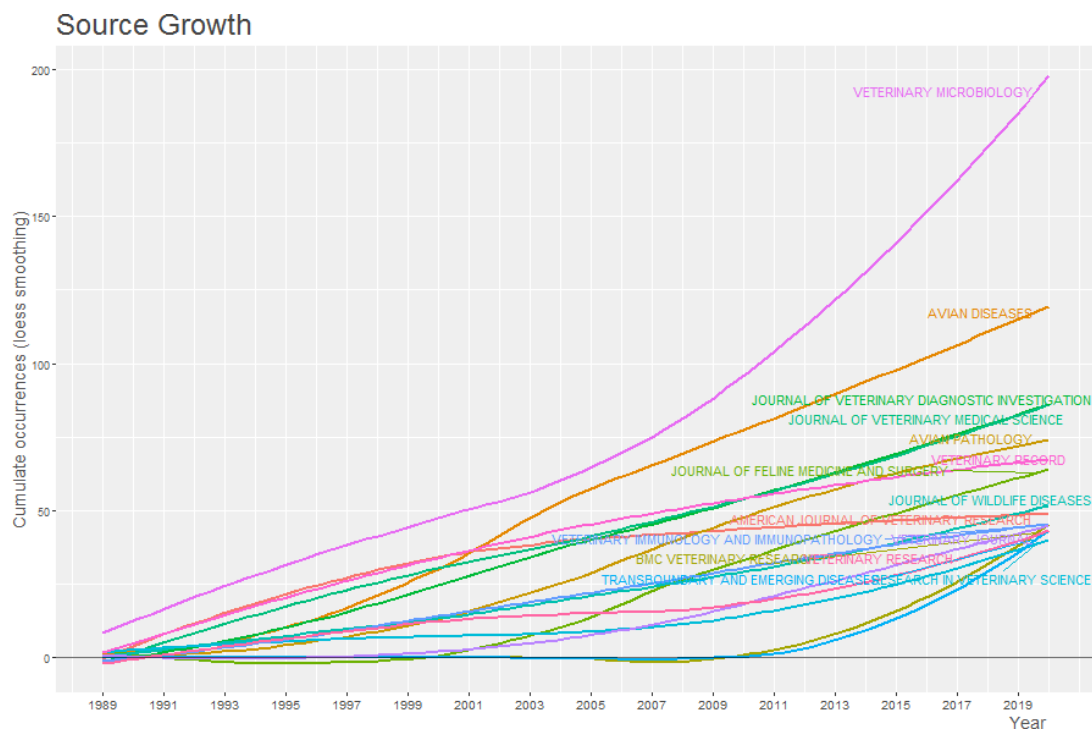


Figure-2: Source Dynamics of Corona Virus Research in Veterinary Science

The top most journals are published in the corona virus research in veterinary Science In the study, highly productive open access journals of corona virus research papers were identified, and it was found that these journals collectively contributed immensely overall view about the impact of the most productive journals in Table 9.

Table 9: Source Impact of Corona Virus Research in Veterinary Science

S. No	Source	h_index	g_index	m_index	TC	NP	PY_start
1	Veterinary Microbiology	34	47	1.0625	3910	191	1989
2	AVIAN Diseases	29	47	0.935483871	2789	115	1990

3	Journal of Veterinary Medical Science	17	27	0.566666667	990	85	1991
4	Journal of Veterinary Diagnostic Investigation	22	39	0.733333333	1770	83	1991
5	AVIAN Pathology	31	53	1.068965517	2957	73	1992
6	Veterinary Record	26	40	0.81250000	1777	67	1989
7	Journal Of Feline Medicine And Surgery	20	33	1	1300	64	2001
8	Journal of Wildlife Diseases	22	32	0.733333333	1140	51	1991
9	American Journal of Veterinary Research	21	29	0.65625	1039	49	1989
10	Transboundary And Emerging Diseases	13	22	1.3	582	44	2011
11	Veterinary Immunology And Immunopathology	20	31	0.666666667	1058	44	1991
12	Veterinary Journal	19	31	0.863636364	1047	42	1999
13	Bmc Veterinary Research	13	17	1.625	397	41	2013
14	Veterinary Research	14	33	0.5	110	41	1993
15	Research in Veterinary Science	14	25	0.4375	682	38	1989

Country wise collaboration of corona virus research in veterinary Science Among the country wise collaboration of Coronavirus research covered by the study tops United States of America with highest number of publications in 491, UK 135, China 134, Japan 132, Germany 91, Italy 88, Canada 81, Brazil 62, France 58. These countries are top ten places in the Corona virus research in veterinary Science in Table 10 and Figure 3.

Table 10: Country Wise Collaboration of Corona Virus Research in Veterinary Science

Country	Articles	Freq	SCP	MCP	MCP_Ratio
Usa	491	0.265693	331	160	0.3259
United Kingdom	135	0.073052	84	51	0.3778
China	134	0.072511	126	8	0.0597
Japan	132	0.071429	110	22	0.1667
Germany	91	0.049242	56	35	0.3846
Italy	88	0.047619	79	9	0.1023
Canada	81	0.043831	50	31	0.3827
Brazil	62	0.03355	51	11	0.1774
France	58	0.031385	27	31	0.5345
Korea	57	0.030844	52	5	0.0877
Australia	41	0.022186	29	12	0.2927
Belgium	40	0.021645	26	14	0.35
Hungary	36	0.019481	24	12	0.3333
Spain	34	0.018398	22	12	0.3529
Sweden	31	0.016775	21	10	0.3226
Turkey	31	0.016775	27	4	0.129
Switzerland	29	0.015693	15	14	0.4828
Netherlands	28	0.015152	14	14	0.5

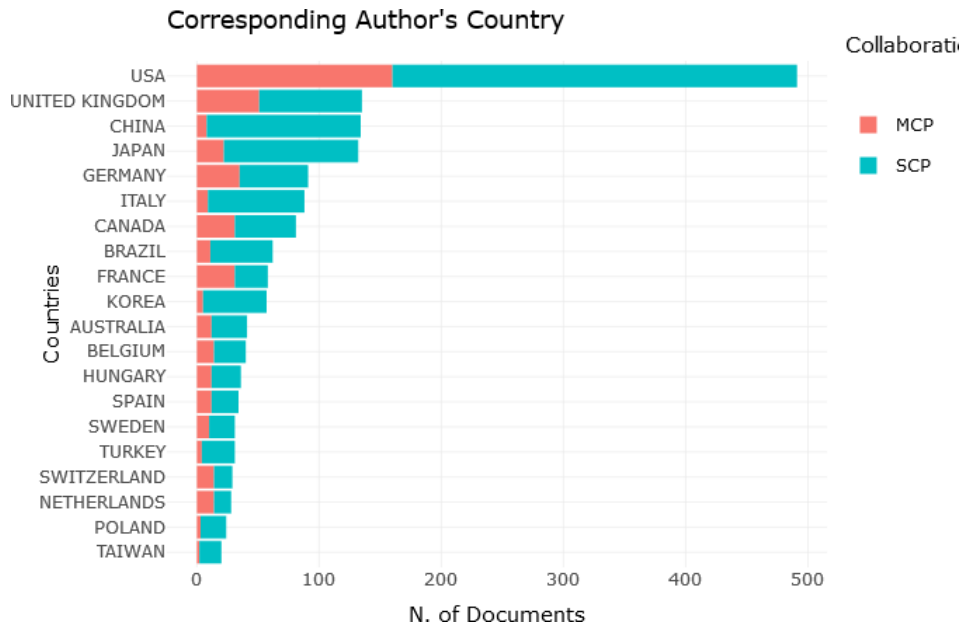


Figure-3: Country Wise Collaboration of Corona Virus Research in Veterinary Science

Results and Discussion

Based on the analysis of corona virus research output has interpreted, and their citation scores emphasized at the national level as well as the international level. The present study analyses the corona virus research output in veterinary science for the study period starting from 1989-2020. The data collected from the WoS database was used for analysis. The overall documents available in 1901 No's, various sources of research 151 No's using keywords 2920 Average citation per document 17.21, Authors 6118, Authors of single-authored documents 119, Authors of multi-authored documents 5999, Documents per Author 0.3111, Authors per Document 3.22, Co-Authors per Documents 5.07 and Collaboration Index 3.45.

Conclusion

Furthermore, the research articles are a significant primary source of publication among the four types of research documents published in the area of corona virus research. The excellent quality research in all aspects of information would help in improving the productivity and also have a research impact.

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