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Mapping of research publications on corona virus disease (COVID-19) in PubMed database: A study

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Abstract--The purpose of this paper is to find out the publications pertaining to “Corona Virus” available in PubMed database. PubMed database provides links to Full Text publications available with publishers and also Free Full Text publications. The data for the study were extracted from Pub Med database using the search term “Corona Virus”. Totally, 18659 publications pertaining to “Corona Virus” during 2010 to 2020 were retrieved. Out of 18659 publications, 57.90% of publications in Full Text with link to publications. The result shows that 89.43% of the publications were available in the form of “Articles” and 98.37% of publications were listed under “Medline Journals”. Among four subject categories, the highest number of publications has been classified under subject “Cancer”. English is a dominating language, since, 96.78% of publications were published in English. COVID-19 disease is originated only in December 2019, within the very short span of time, the researchers and authors are rapidly involved in various research activities in order to investigate the factors for COVID-19. Perhaps, the research findings are published at regular and interval to speed up the research and also to encourage the researchers.

Keywords---COVID-19, Corona Virus, PubMed, Medline Journals.

Introduction

Information and Communication Technology (ICT) plays a very important role in communication of information from person to person or one place to another

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place. It happens only because of advancement and adoption of appropriate technologies for delivering of information. The technology enables to access information available anywhere in the world. Research is another milestone in the higher education. The findings are being communicated to research community in the form of articles and research reports, etc. It also helps to collect information for future research. The people in the world are affected by a virus disease “COVID-19”. It is a pandemic virus disease originated from China during December 2019. Now, it is spread almost all over the world. However, an intensive research is being done on “COVID-19” at world level. The researchers are involved in the research to invent medicines for “COVID-19”. Meanwhile, the researchers are also publishing their research findings on “COVID-19” in the form of articles to create awareness and also to communicate to other researchers. PubMed is a medical database, which links to resources available with the publishers and provides free access to the resources or content in the PubMed platform itself. The study has made an attempt to find out the research productivity on “Corona Virus” in Pub Med database. PubMed is a free resource supporting the search and retrieval of biomedical and life sciences literature with the aim of improving health—both globally and personally. The PubMed database contains more than 30 million citations and abstracts of biomedical literature. It does not include full-text journal articles; however, links to the full text are often present when available from other sources, such as the publisher's website or PubMed Central (PMC), available to the public online since 1996. PubMed was developed and is maintained by the National Center for Biotechnology Information (NCBI), at the U.S. National Library of Medicine (NLM), located at the National Institutes of Health (NIH). The following are the important studies were carried out Chahrour et al (2020) explored the activity and trends of COVID-19 research since its outbreak in December 2019. The PubMed database and the World Health Organization (WHO) databases were used to collect the data pertaining to COVID-19 since December 2019 up until March 18, 2020. Only 564 publications were found from 39 different countries, constituting 24% of all affected countries. China produced the greatest number of publications with 377 publications (67%). With respect to continental research activity, Asian countries had the highest research activity with 434 original publications (77%). Danesh and Ghavi Del (2020) studied the 50 years of Coronavirus scientific publications in the world. The statistical population of this article includes 5128 Coronavirus subject area documents indexed on the WoS from 1970 to 2019. The results showed that the highest science production was in 2005, and the highest citation number was in 2019. “Enjuanes L.” is the most proliferated author, the United States, the most productive country, and the University of Hong Kong, the top organization in Coronavirus in the last half-century. Hossain (2020) evaluated to assess the characteristics of the current studies and create visualizations of knowledge areas in COVID-19. A total of 422 citations were retained in this study, including journal articles, reviews, letters, and other publications. The mean number of authors and citations per document was 3.91 and 2.47, respectively. Research collaboration should be encouraged among global nations to mobilize shared resources. Laksham et al (2020) studied the level perspective of Coronavirus research output during the period of 1989 to March 2020 and data was extracted from the Web of Science citation database using the search string of “Coronavirus” OR “COVID-19” and limited to Open Access Publications during 1989 to 2020, a total of 7381 publications were retrieved. The highest numbers of

publications (561) were published in 2019, which have received 848 citations. It is found that 7381 publications came from 127 countries. United States (USA) is the most productive country with 2801 publications (37.9% and received 107738 Citations. India (80) has to improve in the field of Coronavirus in future. Nasab (2020) assessed the publications of research of COVID-19 from 2019 to 2020. The data were obtained from the Web of Science (WOS), PubMed, and Scopus Core Collection. Out of 227 papers identified, 92 studies were selected for statistical analyses. China accounted for the highest proportion of published research (44 papers, 40.48%), followed by the United States (21 papers, 19.32%), and Canada (7 papers, 6.44%). Batooli and Sayyah (2020) evaluated the scientific productions on COVID-19 in social media over a period of four months. The population study included research papers about the COVID-19 indexed in Dimensions platform from December 2019 to March 2020. It is found 20% of the articles with the highest citation count and 20% of the articles with the highest number of Altmetric Attention Score (AAS), including title, journal, citation and Altmetrics indicators for each article were extracted. Singh et al (2019) analyzed and network visualization of journal articles on Nipah virus for a better understanding of research trends on the subject. Metadata of journal articles were retrieved from Scopus database in 2018. The results revealed inconsistent growth of articles on the subject. There were only few productive authors with ≥ 15 records, but others contributed on the subject occasionally. Sivaprakasam and Joshua (2019) found that 1301 articles with 64% research articles, 38849 citations, country USA with more productive authors, 'Nipah virus' the commonly used keyword, 'Journal of Virology' as preferred journal, Wang LF as productive author of a research group. The recently reported outbreaks in Kerala and Siliguri would increase the research database and alert among the Indian researchers.

Materials and Methods

The data for the study were extracted from PubMed database (<https://pubmed.ncbi.nlm.nih.gov/>) on 17-4-2020. The term "Corona Virus" was used to search the records in PubMed database during the year 2010 to 2020. Totally, 18659 publications pertaining to "Corona Virus" were extracted. The data were searched under various categories such as Full Text, Free Full Text, Books, Journal Articles, Reviews and subjects. The total records retrieved under each category were taken for analysis. Thus extracted data were exported to Ms-Excel for analysis. The followings are the important objectives of this study

1. To find out the Full-Text and Free Full-Text publications available on "Corona Virus" in PubMed database during 2010-2020.
2. To investigate the various types of resources available on "Corona Virus" in PubMed database
3. To examine the various categories of journals related to "Corona Virus" in PubMed database
4. To ascertain the journals related to "Corona Virus" categorized under various subjects and
5. To find out the publications on "Corona Virus" in English and Chinese language.

Results and Discussions

The data collected were classified into various groups as follows and analyzed.

1. Content
2. Resources
3. Journals
4. Subject and
5. Language

Content

An article is considered as one of the important resources for the research community. A lot of research has been conducted on “Corona Virus” all over the world. The research findings are communicated in the form of article, which provides recent information in the subjects. PubMed is one of the reputed databases in medical sciences and it provides information to the research communities. The information can be accessed in PubMed database in two ways (i) Access to Full Text publications through links to publications in the publisher’s websites on payment (ii) Access to Free Full Text publications at free of cost in PubMed database. In this study, two publications (Full Text and Free Full Text) were taken into consideration for analysis and shown in Table 1.

Table 1
Content in PubMed Database

S. No.	Year	Full Text			Free Full Text		
		Nos.	%	Rank	Nos.	%	Rank
1	2020	3816	35.32	1	2022	25.74	1
2	2019	789	7.30	7	674	8.58	6
3	2018	806	7.46	5	680	8.66	5
4	2017	821	7.60	4	695	8.85	4
5	2016	887	8.21	3	738	9.39	2
6	2015	893	8.27	2	732	9.32	3
7	2014	796	7.37	6	659	8.39	7
8	2013	655	6.06	8	548	6.98	8
9	2012	474	4.39	9	391	4.98	9
10	2011	426	3.94	11	356	4.53	11
11	2010	440	4.07	10	361	4.60	10
	Total	10803	100		7856	100	
			57.90%			42.10%	

Table 1 show that PubMed provides links to 35.32 % of Full Text publications on “Corona Virus” published in 2020. It is followed by 2015 (8.27%), 2016 (6.21%) and 2017 (7.60%). Further, it shows that the links were provided to a good number of publications of 2018 (7.46%), 2014 (7.37%) and 2019 (7.30%) through PubMed database. In the remaining years, the links were provided only to less number of publications and it ranges from 3.94% (2011) to 6.06% (2013). The PubMed database also provides access to Free Full Text publications. The results revealed that 25.74% of Free Full Text publications of 2020 available in PubMed

database can be accessed through its website, which is followed by 2016 (9.39%), 2015 (9.32%) and 2017 (8.66%). In PubMed database, more number of Full Text publications (57.90%) was linked than the Free Full Text (42.10%).

Resource

The database contains a variety of resources like books, articles, conference papers, reviews and abstracts. It enables the users to collect information for learning, teaching and research. In this study, three types of resources on “Corona Virus” available in PubMed were taken for analysis and the same is given in Table 2.

Table 2
Resources in PubMed Database

S. No.	Year	Books			Journal Articles			Reviews		
		Nos.	%	Rank	Nos.	%	Rank	Nos.	%	Rank
1	2020	5	62.5	1	3089	31.44	1	371	32.18	1
2	2019	0	0	0	775	7.89	6	78	6.76	6
3	2018	0	0	0	781	7.95	5	74	6.42	7
4	2017	0	0	0	795	8.09	4	88	7.63	5
5	2016	1	12.5	2	853	8.68	2	131	11.36	2
6	2015	1	12.5	2	826	8.41	3	112	9.71	3
7	2014	1	12.5	2	755	7.69	7	107	9.28	4
8	2013	0	0	0	596	6.07	8	78	6.76	8
9	2012	0	0	0	473	4.81	9	45	3.90	9
10	2011	0	0	0	433	4.41	10	35	3.04	10
11	2010	0	0	0	448	4.56	11	34	2.95	11
	Total	8	100		9824	100		1153	100	
		0.07%			89.43%			10.50%		

It is observed from Table 2 that, totally, 8 Books on “Corona Virus” were published in PubMed database. Out of 8 Books, the highest number of Books (5, 62.5%) were published in 2020. Similarly, in year 2020, more number of Journal Articles (31.44%) were also available in PubMed database, it is followed by 2016 (8.68%), 2015 (8.41%) and 2017(8.09%). A good number of Articles published in 2018 (7.95%), 2019 (7.89%) and 2014 (7.69%) were made available in PubMed database. However, very few articles published during the 2010 to 2013 were also available in PubMed database. Review is an important element in a scholarly communication. It gives brief information about the content. In PubMed database, totally, 1153 reviews related to “Corona Virus” were identified during the year 2010-20. Among 1153 reviews, more number of reviews (32.18%) were published in 2020, it is followed by 2016 (11.36%), 2015 (9.71%), and 2014 (9.28%). It is inferred that PubMed database contains more number of “Journal Articles” (89.43%) than other resources like “Books” (0.07%) and “Reviews” (10.50%)

Journals

The Journals in PubMed database are grouped into three major categories e.g. “Dental Journals”, “Medline Journals” and “Nursing Journals” and the same is described in Table 3.

Table 3
Journals in PubMed Database

S. No.	Year	Dental Journals			Medline Journals			Nursing Journals		
		Nos.	%	Rank	Nos.	%	Rank	Nos.	%	Rank
1	2020	35	89.74	1	1366	17.60	1	57	63.33	1
2	2019	0	0	0	498	6.42	8	1	1.11	8
3	2018	0	0	0	720	9.28	6	5	5.56	4
4	2017	0	0	0	753	9.70	5	3	3.33	5
5	2016	1	2.56	2	823	10.60	3	11	12.22	2
6	2015	1	2.56	2	849	10.94	2	7	7.78	3
7	2014	1	2.56	2	786	10.13	4	3	3.33	5
8	2013	0	0	0	638	8.22	7	1	1.11	8
9	2012	1	2.56	2	467	6.02	9	0	0	0
10	2011	0	0	0	426	5.49	11	0	0	0
11	2010	0	0	0	435	5.60	10	2	2.22	7
	Total	39	100		7761	100		90	100	
		0.49%			98.37%			1.14%		

The result in Table 3 show that more number of publications (89.74%) on “Corona Virus” were published in “Dental Journals” in the year 2020.No publication was found in this category during the year 2017-20. In Medline Journals, the highest number of journals (17.60%) were published in 2020, which is followed by 2015 (10.94%), 2016 (10.60%) and 2014 (10.13%). It is further indicated that 9.70% and 9.28% of journals were also published in “Medline Journal” in 2017 and 2018 respectively. In Nursing Journals, 50% of the journals related to “Corona Virus” were published during 2020, followed by 2016 (12.22%), 2015 (7.78%) and 2018 (5.56%). The overall results in this study shown that the highest number of journals (98.37%) related to “Corona Virus” were published in “Medline Journals”. It is observed that “Medline Journals” contained more number of publications (98.37%) than the “Dental Journals” (0.49%) and “Nursing Journals” (1.14%).

Subject

The publications related to “ Corona Virus” available in the PubMed database were classified into four major subject categories as “AIDS”, “Complementary Medicine”, “Cancer” and “Systematic Reviews” and the same is shown in Table 4.

Table 4
Subjects in PubMed Database

S. No.	Year	AIDS			Complementary Medicine			Cancer			Systematic Reviews		
		Nos.	%	R	Nos.	%	R	Nos.	%	R	Nos.	%	R
1	2020	109	17.99	1	182	36.69	1	255	23.72	1	39	50%	1
2	2019	47	7.76	7	44	8.87	4	75	6.98	9	14	17.95	2
3	2018	49	8.09	6	46	9.27	3	91	8.47	3	7	8.97	3
4	2017	50	8.25	5	47	9.48	2	93	8.65	2	0	0	0
5	2016	56	9.24	4	38	7.66	5	78	7.26	8	6	7.69	4
6	2015	65	10.73	2	35	7.06	6	88	8.19	4	5	6.41	5
7	2014	61	10.05	3	27	5.44	7	88	8.19	4	2	2.56	6
8	2013	42	6.93	11	21	4.23	8	84	7.81	6	2	2.56	6
9	2012	42	6.93	11	18	3.63	10	75	6.98	9	2	2.56	6
10	2011	43	7.10	8	17	3.43	11	66	6.14	11	1	1.28	11
11	2010	42	6.93	11	21	4.23	8	82	7.63	7	0	0	0
	Total	606	100		496	100		1075	100		78	100	
			26.87%		22%		47.67%		3.46%				

Table 4 reveals that, majority of the publications (17.99%) related to “Corona Virus” were published under the subject “AIDS” in 2020. Subsequently, in 2015, 10.05% of the publications were further published on same subject, which is followed by 2014 (10.05%), 2016 (9.24%), 2017 (8.25%) and 2018 (8.09%). Under “Complementary Medicine”, the highest number of publications (38.69%) were found in 2020. A good number of publications during 2017(9, 48%), 2018 (9.27%) and 2019 (8.87%) were also published on “Corona Virus”. However, in the subsequent years, 2016 (7.66%), 2015 (7.06%) and 2014 (5.44%), the publications were found less under “Complementary Medicine”. It is indicated that more number of publications were published under “Cancer” e.g. 2020 (23.72%), followed by 2017 (8.65%), 2018 (8.47%), 2015 (8.19%) and 2014(8.19). The publications were found less from 6.14% to 7.81% during the year 2011 to 2013 under “Cancer”. It is further observed that 50% of the journals were published in 2020 under “Systematic Reviews” and remaining 50% of the journals were published during 2010 to 2019.

Language

The language is the most important for communication of scholarly content. English is a common language preferred by publishing industry. It reaches at various groups of community like students, faculty, and researchers. It also creates visibility for the content at global level. In this study, the research contents/publications published in “English” and “Chinese” language alone were taken for analysis and the same is given in Table 5.

Table 5
Language of Publications in PubMed Database

S.No.	Year	English			Chinese		
		Nos.	%	R	Nos.	%	R
1	2020	3798	35.20	1	273	76.04	1
2	2019	790	7.32	7	2	0.56	10
3	2018	806	7.47	6	1	0.28	11
4	2017	818	7.58	4	6	1.67	9
5	2016	887	8.22	3	13	3.62	3
6	2015	893	8.28	2	15	4.18	2
7	2014	809	7.50	5	10	2.79	5
8	2013	656	6.08	8	10	2.79	5
9	2012	475	4.40	9	11	3.06	4
10	2011	420	3.89	11	9	2.51	7
11	2010	438	4.06	10	9	2.51	7
	Total	10790	100		359	100	
		96.78%				3.22%	

The results in Table 5 show that “English” is a dominating language used to publish a majority of publications (35.20%) on “Corona Virus” in PubMed database particularly in 2020. In 2015, a considerable number of publications (8.28%) were also published in English, which is followed by 2016 (8.22%), 2017 (7.58%) and 2014 (7.50%). However, the publications in the remaining years were found less in “English”. During 2020, the highest number of publications (76.04%) on “Corona Virus” were published in Chinese and in remaining years, the percentage of publications were less and ranges from 0.28 % (2018) to 4.18% (2015). Generally, the results show that majority of the publications were found in English language (96.78%) than Chinese(3.22%).

Conclusion

Research plays a vital role in the higher educational institutions. It leads to creation of new subjects or solves the existing social problems by sharing the findings with peer groups. The research findings are published in the form of articles. In this study, the publications pertaining to “Corona Virus” were retrieved in PubMed database. Even though, the COVID-19 disease is originated only in December 2019, within the very short span of time, the researchers and authors are rapidly involved in various research activities in order to investigate the factors for COVID-19. Perhaps, the research findings are published at regular and interval to speed up the research and also to encourage the researchers. Based on the results of the study, the following are recommended:

1. The publications on “Corona Virus” were found less in the past years (2010 -2019), however, the growth of publications were increased in 2020.
2. The researchers and authors shall be encouraged to involve in the research and publish their findings in the journals preferably in open access journals to increase the literature on “Corona Virus”
3. Collaborative research shall be encouraged among the researchers to increase the publications on “Corona Virus” and

4. Online courses shall be introduced on “Corona Virus” to increase its publications.

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