

# A BIBLIOMETRIC ANALYSIS AND VISUALISATION OF RESEARCH TRENDS IN COVID AND DIABETICS

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## Abstract

COVID19 is a pandemic caused by SARS-CoV-2. Thus this bibliometric analysis of COVID and diabetics had been conducted to understand the active authors, organizations, journals, and countries involved. All articles related to diabetics and COVID, published in 2020, from “Scopus” were analyzed using the VOS viewer to develop analysis tables and visualization maps. This article had set the objective to consolidate the literature regarding diabetics and COVID and also to find out the trends related to the same. The most productive authors are Chen J and Li J, having the highest number of citations and average citations. Li J is the most active author, who published the highest number of co-authorship linkages in this domain. The most productive research organization engaged in the research of COVID and diabetics is the Department of Endocrinology, Post Graduate Institute of Medical Education and Research. Diabetes/Metabolism Research and Reviews is the most active journals with the highest citation, linkages, and average citation. Cell Metabolism is the journal with the highest average citation. The most productive research organization engaged in the research of COVID and diabetics is the Department of Endocrinology, Post Graduate Institute of Medical Education and Research.

**Keywords:** COVID, Diabetics, Bibliometric analysis, VOS viewer, Pandemic

**How to cite this article:** Singh RK(2021): A bibliometric analysis and visualisation of research trends in COVID and diabetics, *Ann Trop Med & Public Health*; 23(S18): SP232034 DOI:

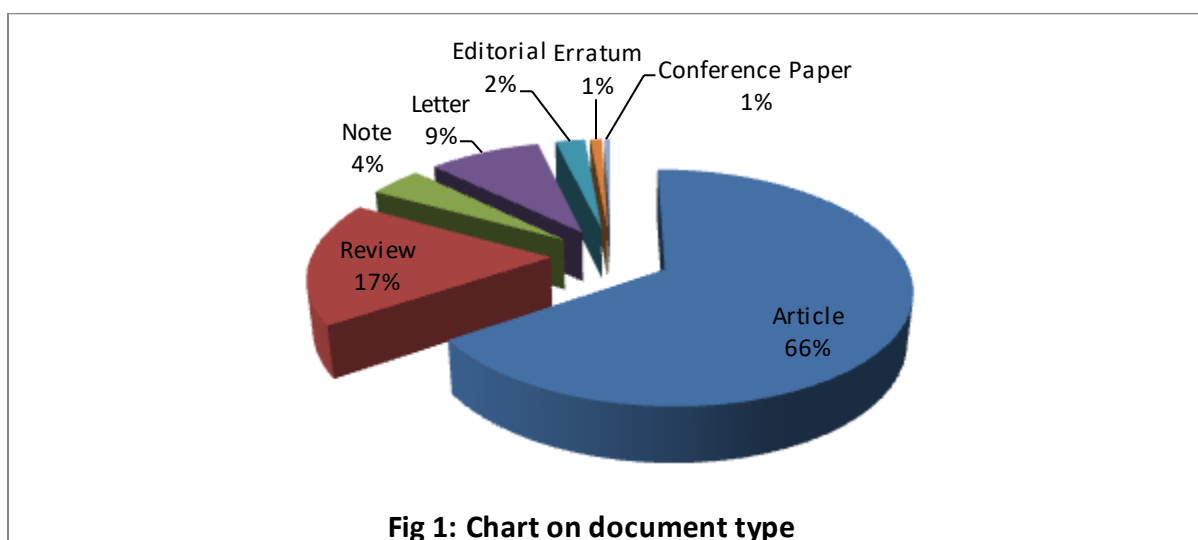
<http://doi.org/10.36295/ASRO.2020.232034>

## 1. Introduction

Coronavirus disease19 (COVID19) is a pandemic and caused by SARS COV2. COVID19 was first reported in Wuhan, China, and its spread across the world. COVID19 had reported with a comparatively lower mortality rate but is capable of super spreading and social spreading in a short period. Only Social distancing and self-hygiene can avoid this pandemic at this stage. Immunity is very important to control the super spread of the virus. Personal hygiene should include hand washing, use of masks, sanitizer, gloves, and maintaining social distancing. COVID19 is disastrous with people having comorbidities. A higher degree of research is needed to control the pandemic. Hygiene is an important social determinant of health during the pandemic. There is a huge challenge faced in solid waste disposal during the pandemic. Health workers play a great role in stopping the pandemic. Motivations, overwork, risk of infection, job pressure, lack of rotation are the serious problems faced by health care workers in the field. Till now the treatments involve drug repurposing and we are miles away from an effective vaccine. Remdesivir, Favipiravir, Chloroquine, and Lopinavir/Ritonavir have commonly used drugs for treating COVID19 patients across the world. This article is arranged in five sections. The first section is the introduction, followed by the discussion of the methodology by which the research was conducted. The third section deals with results and discussion. The fourth section deals with the conclusion.

## 2. Research Methodology

Only the Scopus source had been used in this bibliometric analysis. For the article selection, we had used the Boolean “TITLE-ABS (COVID AND DIABETICS)” on 20/10/2020. This first round of search produced an outcome of one hundred and ninety-eight documents, in the English language. The various types of documents and their details had been shown in figure 1. We had selected only the articles for this review and thus excluded all the other types of documents in this research.



**Fig 1: Chart on document type**

We used all the one hundred and thirty-nine articles (66% of documents) to conduct bibliometric analysis using VOS Viewer. We were inspired by bibliometric analysis in its presentation style, analysis, and methodology from the works (Wang, Xu and Škare, 2020)(Soosaraei *et al.*, 2018)(Hong *et al.*, 2019)(Winkowski, 2019)(Heshmati and Hashempour, 2020)(Ivanov *et al.*, 2020)(Garrigos-simon and Botella-carrubi, 2018)(Li *et al.*, 2019)(Mas-tur and Guijarro, 2019)(Gao *et al.*, 2020).

## 2.1 Research Objectives

- a) To consolidate the literature regarding COVID19 and Diabetics
- b) To find out the trends related to research in COVID19 and Diabetics

The following research questions are framed for conducting bibliometric analysis systematically.

## 2.2 Research Questions

- a) Which are the main journals and articles working related to COVID19 and Diabetics?
- b) Which are the main organizations and countries working on COVID19 and Diabetics?
- c) Who are the active researchers working on COVID19 and Diabetics?

## 2.3 Methods and tools for evaluation

We had used the VOS viewer for conducting bibliometric analysis and visualization. Out of multiple tools available in the VOS viewer, we had used Co-authorship analysis, Co-occurrence analysis, and citation analysis for this research.

Co-authorship analysis measures the relatedness of items based on the number of co-authored documents. Co-authorship analysis can be possible with three units of analysis, namely, authors, organizations, and countries. Co-authorship analysis had been conducted by analyzing the number of co-authored documents, citations, and average citations per co-authored documents, links, and link strength to identify the closely related authors in a research area. The items with the highest links and link strength are considered for tracing the most effective researchers, journals, articles, organizations, and countries.

Co-occurrence analysis measures the relatedness of items based on the number of documents in which the keywords occur together. Co-occurrence analysis can measure the trends in research. Co-occurrence analysis can be possible with three units of analysis, namely, author keywords, index keywords, and all keywords. The trending keywords and the trend in research are identified by finding out keywords with the highest occurrence and link strength.

Citation analysis can be possible with five units of analysis, namely, authors, documents, sources, organizations, and countries. For citation analysis, citations per documents and total citations were used to identify the most effective researchers, journals, articles, organizations, and countries.

### 3. Results and discussion

Table 1 shows the details with active researchers in the domain of COVID and Diabetics. Co-authorship analysis and citation analysis were used in this research. While taking authors as a unit of analysis for the co-authorship analysis, we have taken the parameters of the minimum number of documents of an author as three and the minimum number of citations of authors as one. This combination plotted the map of eight thresholds out of one thousand and fifty-three authors, in twenty-one clusters. The network visualization map of co-authorship analysis plotted in figure 2, points out the major researchers with their strong co-authorship linkages. The major clusters involved in the research with co-authorship can be identified in figure 2. Table 1 makes it clear that the most productive authors are Chen J and Li J, having the highest number of citations and average citations. Li J is the most active author, who published the highest number of co-authorship linkages in this domain. From table 2 we can conclude the Chinese authors are leading in respect of citations in research regarding diabetes and COVID.

Table 1: Analysis of author activity

Results of Citation analysis				Results of co-authorship analysis (Unit of analysis is authors)	
Authors	Documents	Citations	Average Citations per documents	Authors	Link Strength
Chen J.	3	63	21	Li J.	4
Li J.	3	63	21	Chen J.	3
Pal R.	3	48	16	Chee Y.J.	3
Kumar A.	3	33	11	Yeoh E.	3
Chee Y.J.	3	28	9.3	Huang J.	3
Yeoh E.	3	28	9.3	Liu Y.	2

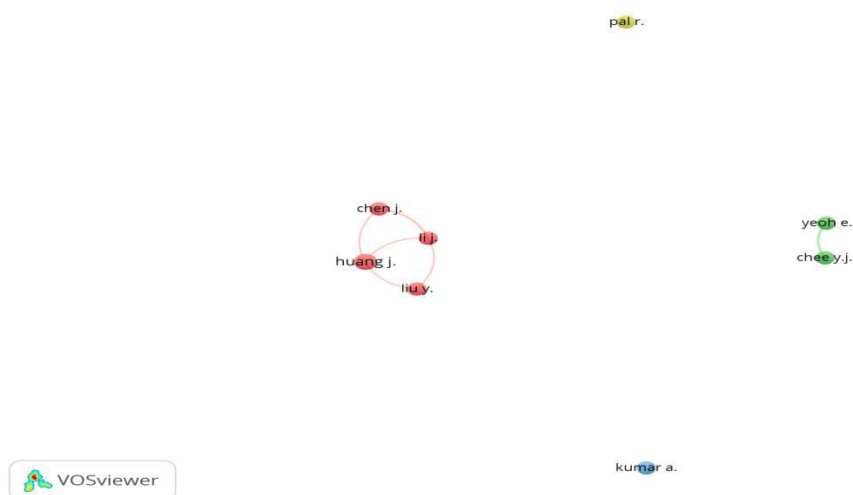


Figure 2: Co-authorship analysis on basis of authors

In Co-occurrence analysis, we had used all keyword analyses, by keeping the minimum number of occurrence of a keyword as thirty-five. This combination plotted the map of twenty-four thresholds out of one thousand seven hundred and ninety-six keywords, in three clusters. The network visualization of co-occurrence analysis using all keywords has been shown in figure 3. Figure three identifies the major keywords associated with COVID and diabetics.

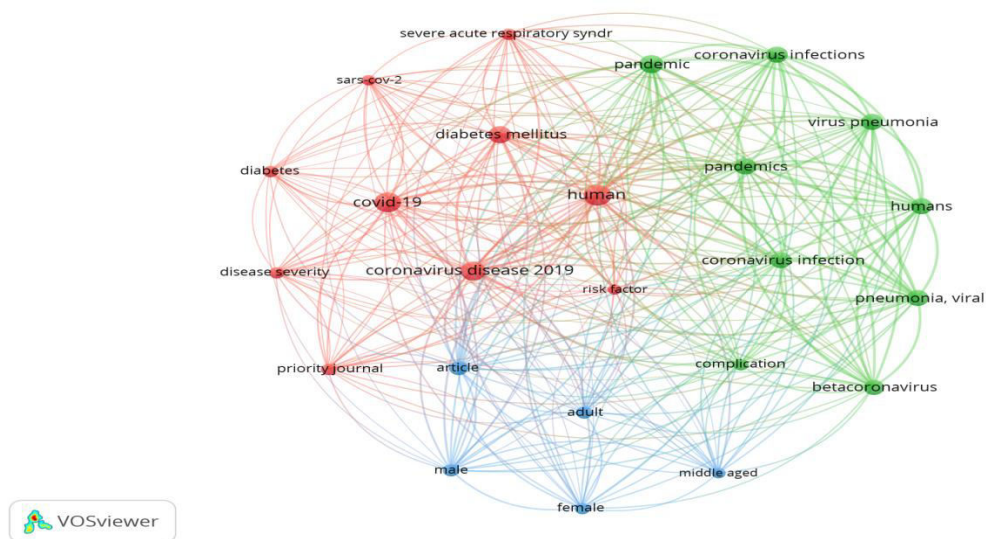


Figure 3: Co-occurrence analysis on basis of all keywords

Table 2 shows the active organizations engaged in research on COVID and diabetics. Co-authorship analysis and citation analysis were used in this analysis. While taking organizations as a unit of analysis for the co-authorship analysis, we have taken the parameters of the minimum number of documents of an author as two and the minimum number of citations of organizations as one. This combination plotted the map of nine thresholds out of six hundred and ninety-one organizations, in four clusters. The network visualization map of co-authorship analysis plotted in figure 4, points out the major research organizations with their co-authorship links. The major clusters involved in the research with co-authorship can be identified in figure 4. Figure 4 makes it clear that there is poor linkage between top organizations involved in the research on COVID and diabetics. Similarly, five leading research organizations in the area of COVID and diabetics had been highlighted in table 2. The results in table 2 make it clear that the most productive research organization engaged in the research of COVID and diabetics is the Department of Endocrinology, Post Graduate Institute of Medical Education and Research as it has the highest number of citations and highest average citation.

Table 2: Analysis of Organisations

Organizations	Country	Documents	Citations	Average Citations per document
Department of Endocrinology, Post Graduate Institute of Medical Education and Research	India	3	48	16
Khoo Teck Puat Hospital	Singapore	2	27	13.5
Endocrinology and Metabolism Research Center, Endocrinology and Metabolism Clinical Sciences Institute, Tehran University Of Medical Sciences	Iran	4	3	0.75
Cardiovascular Research Center, Alborz University of Medical Sciences	Iran	2	1	0.5
Department of Respiratory Medicine, All India Institute of Medical Sciences (AIIMS)	India	2	1	0.5

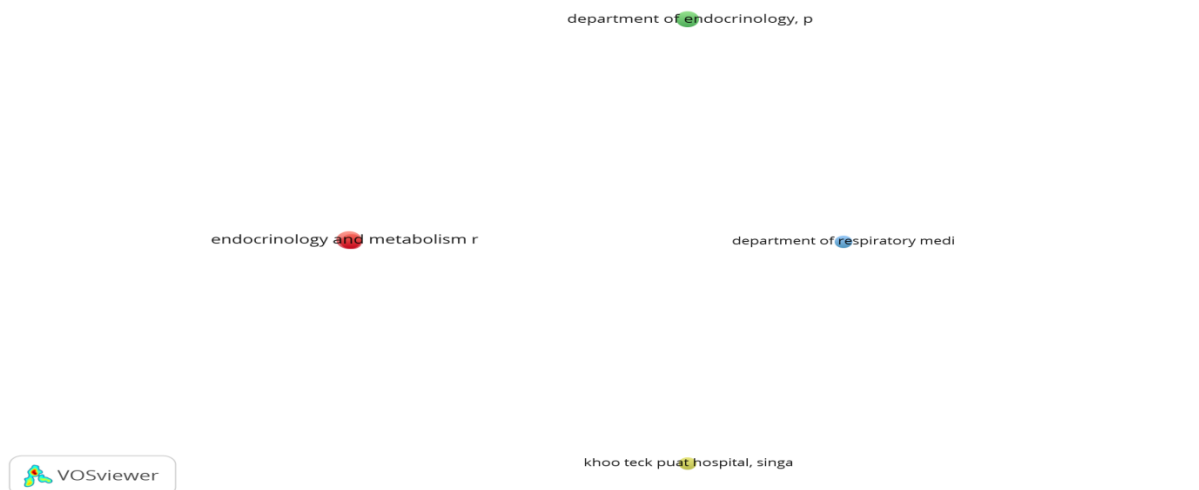


Figure 4: Co-authorship analysis on basis of Organisations

Table 3 shows the countries actively engaged in research on COVID and diabetics. Co-authorship analysis and citation analysis were used in this analysis. While taking countries as a unit of analysis for the co-authorship analysis, we have taken the parameters of the minimum number of documents of a country as ten and the minimum number of citations of a country as two. This combination plotted the map of six thresholds out of forty-nine countries in three clusters. The network visualization map of co-authorship analysis plotted in figure 5, points out the major research countries with their co-authorship collaborations. The major clusters involved in the research with co-authorship can be identified in figure 5. Similarly, top countries in the area of COVID and diabetics had been highlighted in table 3. From table three it's clear that the highly active country in the research of COVID and diabetics is China with the highest number of citations and average citations. However, the country with the highest number of publications in India and the country with the highest co-authorship linkage is the USA.

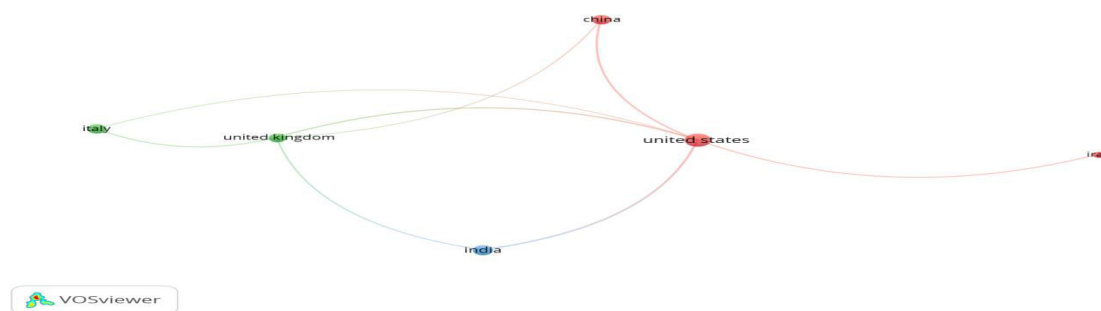


Figure 5: Co-authorship analysis on basis of Country

Table 3: Analysis of activities of countries

Results of Citation analysis				Results of co-authorship analysis (Unit of analysis is countries)		
Country	Documents	Citations	Average Citations per documents	Country	Link Strength	H-Index
China	24	442	18.4	United States	13	2386
India	28	118	4.2	United Kingdom	8	1487
Iran	12	10	0.8	India	6	624
Italy	25	75	3.0	China	4	884

United Kingdom	20	105	5.3	Italy	3
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Table 4 shows the highly cited articles, engaged in research on children and COVID-19. Link analysis and citation analysis were used in this analysis. We have taken the parameters of the minimum number of citations as four. This combination plotted the map of forty thresholds out of one hundred and ninety-eight documents. The highly cited articles are highlighted in table 4.

Table 4: List of highly cited articles

Articles	Citations	Link	Journal	Title
Guo W. (2020)	205	8	Diabetes/Metabolism Research and Reviews	Diabetes is a risk factor for the progression and prognosis of COVID-19
Zhu L. (2020)	142	3	Cell Metabolism	Association of Blood Glucose Control and Outcomes in Patients with COVID-19 and Pre-existing Type 2 Diabetes
Cariou B. (2020)	64	2	Diabetologia	Phenotypic characteristics and prognosis of inpatients with COVID-19 and diabetes: the CORONADO study
Banerjee D. (2020)	64	0	Kidney International	COVID-19 infection in kidney transplant recipients
Li J. (2020)	44	1	Diabetes, Obesity and Metabolism	COVID-19 infection may cause ketosis and ketoacidosis

Table 5 shows the journals actively engaged in research on COVID and diabetics. Link analysis and citation analysis were used in this analysis. We have taken the parameters of the minimum number of documents of a journal as two and the minimum number of citations of a journal as one. This combination plotted the map of twenty-two thresholds out of one hundred and thirty-one journals. Diabetes/Metabolism Research and Reviews is the most active journals with the highest citation, linkages, and average citation. Cell Metabolism is the journal with the highest average citation.

Table 5: Analysis of journal activity

Journals	Documents	Citations	Average Citations per documents	Link Strength	H-Index	Publisher
Diabetes/Metabolism Research And Reviews	2	205	102.5	14	105	John Wiley and Sons Ltd, USA
Cell Metabolism	3	150	50	7	244	Cell Press, USA
Diabetologia	2	64	32	0	220	Springer Verlag, Germany
Diabetes And Metabolism	2	26	13	4	85	Elsevier Masson, France
American Journal Of Tropical Medicine And Hygiene	2	18	9	1	144	American Society of Tropical Medicine and Hygiene, USA

#### 4. Conclusion

. By analyzing the results from the analysis by using VOS viewer and discussion in the above section, we conclude that the most active authors are from China. The most productive authors are Chen J and Li J, having the highest number of citations and average citations. Li J is the most active author, who published the highest number of co-authorship linkages in this domain. The most productive research organization engaged in the research of COVID and diabetics is the Department of Endocrinology, Post Graduate Institute of Medical Education and Research as it has the highest number of citations and highest average citation.

Diabetes/Metabolism Research and Reviews is the most active journals with the highest citation, linkages, and average citation. Cell Metabolism is the journal with the highest average citation. The most productive research organization engaged in the research of COVID and diabetics is the Department of Endocrinology, Post Graduate Institute of Medical Education and Research as it has the highest number of citations and highest average citation.

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