A BIBLIOMETRIC ANALYSIS AND VISUALISATION OF RESEARCH TRENDS IN COVID-19 AND COMMUNITY TRANSMISSION

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Abstract

COVID-19 is a pandemic caused by SARS COV2. Thus this bibliometric analysis of COVID-19 and community transmission had been conducted to understand the active authors, organizations, journals, and countries involved. All articles related to precautions against COVID-19, 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 community transmission and COVID-19 and also to find out the trends related to the same. The most active authors are from China. The most productive author is Chen W having the highest average citations and the highest number of citations. Wang X and Wang Y are the most active authors, having the highest number of co-authorship linkages and several publications in this domain. The most productive research organization engaged in the research of community transmission and COVID-19 is the ISI Foundation, Italy as it has the highest number of citations and highest average citation. The highly active country in the research of community transmission and COVID is China with the highest number of citations, average citations, and publications. However, the country with the highest number of co-authorship linkages is the USA. The Lancet is the most active journal with the co-highest citation, and average citation.

Keywords: COVID, community transmission, Bibliometric analysis, VOS viewer, Pandemic

How to cite this article: Singh S, Jayaram R(2020): A bibliometric analysis and visualisation of research trends in COVID-19 and community transmission, Ann Trop Med & Public Health; 23(S19): SP23211.
DOI: http://doi.org/10.36295/ASRO.2020.231767

1. Introduction

Coronavirus disease-19 (COVID-19) is a pandemic and caused by SARS COV-2 (Alkansa, Lakkis and El Zein, 2021; Alpaydin et al., 2021; Kharrat et al., 2021; Romero et al., 2021; van Oosterhout et al., 2021). COVID-19 was first reported in Wuhan, China, and its spread across the world (Chen et al., 2021; Elbashir and Almuayqil, 2021; Sulaymon et al., 2021; Zhu et al., 2021). COVID-19 had reported with a comparatively lower mortality rate but is capable of super spreading and social spreading in a short period (Lakshmi Priyadarsini and Suresh, 2020; Martínez-Álvarez et al., 2020; Paglia, 2020). Only Social distancing and self-hygiene can avoid this pandemic at this stage (Melenli and Topkaya, 2020; Moukarzel et al., 2020; Olivera-La Rosa, Chuquichambi and Ingram, 2020; Vokó and Pitter, 2020). 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 (Cayo-Rojas and Cervantes-Ganoza, 2020; Smith et al., 2020; Sollena et al., 2020; Donde et al.,
COVID-19 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 (Cayo-Rojas and Cervantes-Ganoza, 2020; Smith et al., 2020; Sollena et al., 2020; Donde et al., 2021). There is a huge challenge faced in solid waste disposal during the pandemic (Bellizzi et al., 2020; Kulkarni and Anantharama, 2020; Nzeadibe and Ejike-Alieji, 2020; Nzediegwu and Chang, 2020; Ouhsine et al., 2020; Sharma et al., 2020; Tassakra et al., 2020; Urban and Nakada, 2021; Mohammad, Goli and Singh, 2021; Penteado and Castro, 2021; Torkashvand et al., 2021). 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. Antiviral drugs also play an important role in treating COVID-19 patients. Remdesivir, Favipiravir, Chloroquine, and Lopinavir/Ritonavir have commonly used drugs for treating COVID-19 patients across the world (Cantini et al., 2020; Chen, Wang and Chen, 2020; Perveen et al., 2020; Shrestha et al., 2020; Frediansyah et al., 2021) (Singh and Jayaram, 2020). 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 was used in this bibliometric analysis. For the article selection, we had used the Boolean “TITLE-ABS (COVID AND COMMUNITY TRANSMISSION)” on 23/10/2020. This first round of search produced an outcome of nine hundred and fifteen 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](http://doi.org/10.36295/ASRO.2020.231767)
Research Objectives

a) To consolidate the literature regarding COVID-19 and community transmission
b) To find out the trends related to research in COVID-19 and community transmission

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

Research Questions

a) Which are the main journals and articles working related to COVID and community transmission?
b) Which are the main organizations and countries working on COVID and community transmission?
c) Who are the active researchers working on COVID and community transmission?

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-19 and community transmission. 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 four and the minimum number of citations of authors as two. This combination plotted the map of twenty-seven thresholds out of four thousand nine hundred and fifty-two authors, in eight clusters.
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 author is Chen W having the highest average citations and the highest number of citations. The most active authors, having the highest number of co-authorship linkages and several publications in this domain. From table 2 we can conclude the Chinese authors are leading in respect of citations in research regarding precautions against COVID-19.

Table 1: Analysis of author activity

<table>
<thead>
<tr>
<th>Authors</th>
<th>Documents</th>
<th>Citations</th>
<th>Average Citations per documents</th>
<th>Link Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chen W.</td>
<td>4</td>
<td>538</td>
<td>134.5</td>
<td>Wang X.</td>
</tr>
<tr>
<td>Wilder-Smith A.</td>
<td>7</td>
<td>536</td>
<td>76.6</td>
<td>Wang Y.</td>
</tr>
<tr>
<td>Zhang J.</td>
<td>5</td>
<td>373</td>
<td>74.6</td>
<td>Zhang L.</td>
</tr>
<tr>
<td>Li J.</td>
<td>6</td>
<td>409</td>
<td>68.2</td>
<td>Chen J.</td>
</tr>
<tr>
<td>Jr.</td>
<td>5</td>
<td>303</td>
<td>60.6</td>
<td>Wang Z.</td>
</tr>
</tbody>
</table>

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 sixty-four. This combination plotted the map of forty-four thresholds out of five thousand seven hundred and sixty-nine keywords, in four 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 community transmission against COVID.
Table 2 shows the active organizations engaged in research on community transmission of COVID-19. 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 three and the minimum number of citations of organizations as two. This combination plotted the map of eleven thresholds out of three thousand seven hundred and ten organizations, in six 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 a poor linkage between top organizations involved in the research on community transmission against COVID-19. Similarly, five leading research organizations in the area of COVID and precautions 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 community transmission against COVID-19 is the ISI Foundation, Italy as it has the highest number of citations and highest average citation.

Table 2: Analysis of Organisations

<table>
<thead>
<tr>
<th>Organizations</th>
<th>Country</th>
<th>Documents</th>
<th>Citations</th>
<th>Average Citations per document</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISI Foundation, Italy</td>
<td>Italy</td>
<td>3</td>
<td>360</td>
<td>120.0</td>
</tr>
<tr>
<td>Fred Hutchinson Cancer Research Center</td>
<td>USA</td>
<td>3</td>
<td>311</td>
<td>103.7</td>
</tr>
<tr>
<td>Heidelberg Institute of Global Health, University of Heidelberg</td>
<td>Germany</td>
<td>3</td>
<td>206</td>
<td>68.7</td>
</tr>
<tr>
<td>London School of Hygiene and Tropical Medicine</td>
<td>UK</td>
<td>4</td>
<td>171</td>
<td>42.8</td>
</tr>
<tr>
<td>School of Mathematical and Statistical Sciences, Arizona State University</td>
<td>USA</td>
<td>4</td>
<td>86</td>
<td>21.5</td>
</tr>
</tbody>
</table>

Figure 3: Co-occurrence analysis on basis of all keywords
Table 3 shows the countries actively engaged in research on COVID-19 and community transmission. 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 thirty-four thresholds out of one hundred and fifty countries in four. 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-19 and community transmission had been highlighted in table 3. From table three it's clear that the highly active country in the research of community transmission and COVID-19 is China with the highest number of citations, average citations, and publications. However, the country with the highest number of co-authorship linkages is the USA.
Table 3: Analysis of activities of countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Documents</th>
<th>Citations</th>
<th>Average Citations per documents</th>
<th>Country</th>
<th>Link Strength</th>
<th>H-Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>112</td>
<td>10704</td>
<td>95.6</td>
<td>United States</td>
<td>282</td>
<td>2386</td>
</tr>
<tr>
<td>Germany</td>
<td>14</td>
<td>803</td>
<td>57.4</td>
<td>United Kingdom</td>
<td>263</td>
<td>3176</td>
</tr>
<tr>
<td>Singapore</td>
<td>35</td>
<td>1081</td>
<td>30.9</td>
<td>China</td>
<td>132</td>
<td>884</td>
</tr>
<tr>
<td>Japan</td>
<td>21</td>
<td>607</td>
<td>28.9</td>
<td>Italy</td>
<td>92</td>
<td>1176</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>22</td>
<td>622</td>
<td>28.3</td>
<td>Australia</td>
<td>102</td>
<td>1001</td>
</tr>
</tbody>
</table>

Table 4 shows the highly cited articles, engaged in research on precautions against 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 two hundred and thirty-two thresholds out of nine hundred and fifteen documents. The highly cited articles are highlighted in table 4.

Table 4: List of highly cited articles

<table>
<thead>
<tr>
<th>Articles</th>
<th>Citations</th>
<th>Co-citation Link</th>
<th>Journal and Publisher details</th>
<th>H-Index</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Huang C. (2020)</td>
<td>7734</td>
<td>36</td>
<td>The Lancet Elsevier Ltd, UK</td>
<td>747</td>
<td>Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China</td>
</tr>
<tr>
<td>Wan Y. (2020)</td>
<td>841</td>
<td>0</td>
<td>Journal of Virology, American Society for Microbiology, USA</td>
<td>282</td>
<td>Recepter recognition by the novel coronavirus from Wuhan: An analysis based on decade-long structural studies of SARS coronavirus</td>
</tr>
</tbody>
</table>

Table 5 shows the journals actively engaged in research on COVID-19 and community transmission. 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 one hundred and twenty-one thresholds out of five hundred and forty-seven journals. The Lancet is the most active journal with the co-highest citation, and average citation.
Table 5: Analysis of journal activity

<table>
<thead>
<tr>
<th>Journals</th>
<th>Documents</th>
<th>Citations</th>
<th>Average Citations per documents</th>
<th>Link Strength</th>
<th>H-Index</th>
<th>Publisher</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Lancet</td>
<td>3</td>
<td>4730</td>
<td>1576.7</td>
<td>85</td>
<td>747</td>
<td>Elsevier Ltd, UK</td>
</tr>
<tr>
<td>New England Journal of Medicine</td>
<td>3</td>
<td>1822</td>
<td>607.3</td>
<td>93</td>
<td>987</td>
<td>Massachusetts Medical Society, USA</td>
</tr>
<tr>
<td>The Lancet Infectious Diseases</td>
<td>2</td>
<td>719</td>
<td>359.5</td>
<td>4</td>
<td>217</td>
<td>Lancet Publishing Group, UK</td>
</tr>
<tr>
<td>Cell</td>
<td>9</td>
<td>2329</td>
<td>258.8</td>
<td>67</td>
<td>747</td>
<td>Cell Press, USA</td>
</tr>
<tr>
<td>Bioscience Trends</td>
<td>3</td>
<td>461</td>
<td>153.7</td>
<td>3</td>
<td>28</td>
<td>International Advancement Center for Medicine &amp; Health Research Co., Ltd, Japan</td>
</tr>
</tbody>
</table>

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 author is Chen W having the highest average citations and the highest number of citations. Wang X and Wang Y are the most active authors, having the highest number of co-authorship linkages and several publications in this domain. The most productive research organization engaged in the research of community transmission and COVID-19 is the ISI Foundation, Italy as it has the highest number of citations and highest average citation. The highly active country in the research of community transmission and COVID-19 is China with the highest number of citations, average citations, and publications. However, the country with the highest number of co-authorship linkages is the USA. The Lancet is the most active journal with the co-highest citation, and average citation.

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Olivera-La Rosa, A., Chuquichambi, E. G. and Ingram, G. P. D. (2020) ‘Keep your (social) distance: Pathogen...


