Short Communication

Bibliometric analysis of contributions to COVID-19 research in Malaysia

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ABSTRACT

Introduction: The advent of COVID-19 has led to an exponential rise in related publications to provide a knowledge driven approach to tame the tide of infection and impact in all spheres. This study gives an insight into COVID-19 research publication pattern in Malaysia using bibliometric analysis.

Method: COVID-19 publications on Scopus database between January 1, 2020, and August 26, 2022, were extracted using predetermined search strings. Inclusion and exclusion criteria were set, and data was extracted from the database. Descriptive statistics was used to summarize our findings.

Results: A total of 3,553 COVID-19 related papers were retrieved out of global count of 392,613 and 16,466 for Southeast Asia (SEA). This implies that 0.9% and 21.6% is contributed globally and SEA respectively. Indonesia, Malaysia and Singapore are the three top countries with highest research outputs in the region. This may be correlated to high GDP per capita, research and development, and research and development expenditure. Most of the publications are article/original research (n = 2832, 67%). Ministry of Higher education is the top funding sponsor and Universiti Malaya is the highest contributor and the most cited (n = 466, 4920 citations). The majority of publications are from physical sciences (30.3%), but medicine subcategory produced the highest number of papers (1,586). The top journal was International Journal of Environmental and Public Health (n = 96 publications). Most active collaborating country was the United Kingdom and most active author was from Monash University.

Conclusion: Malaysian institutions have made profound contributions to COVID-19 research globally and in SEA. However, there is a need for continuous efforts to improve research outputs on the topic.

1. Introduction

COVID-19 became a global pandemic on March 11, 2020, after the declaration by World Health Organization due to its spread across nations and high infectious rate [1]. The disease is characterized by pneumonia-like symptoms of dry cough, fatigue, fever and lymphopenia [2]. A number of preventive measures: physical distancing, mask wearing in public, staying in ventilated places, hand hygiene and vaccination are put in place to mitigate the spread of infections. To date, more than 600 million and 6.48 million infections and deaths have been reported worldwide respectively [3]. In Malaysia, a number of cases more than 4.77 million are reported with more than 36,000 deaths, city of Selangor accounted for 1.64 million cases and 10,797 deaths out of this number [3].

The increasing number of infections and massive impact of the pandemic have led to exponential rise in research outputs across nations among scientists around the globe, with Malaysia being a player in this [4]. Bibliometric study gives statistical overview of research trends in a particular area, research collaboration and citation analysis. It detects hotspots of research interests, generates information maps, as well as aids researchers in identifying research gaps [5]. The bibliometrics of 706 COVID-19 research in Southeast Asia gave a comparison of the trend of involvement of the eleven countries in the region. The comparison revealed that Malaysian, Singaporean, and Thai institutions and authors were responsible for the majority of the research outputs in the region [6].

In this study, we evaluate for the first time comprehensive bibliometric analysis of Malaysia’s contribution to COVID-19 research using Scopus database since the outbreak of the disease.

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2. Methods and materials

The method adapted for this manuscript was similar to a recently published bibliometric analysis by Adebisi et al. [7]. For the purpose of this bibliometric study, the primary and only database that was searched was Scopus. When compared to the Web of Science, this database has over 23,000 more indexed journals from over 5,000 more publishers [8]. These journals cover all areas of scientific study. Since Scopus contains all the information found in Medline, it is clearly the superior resource [8,9]. The database provides two different ways to search for information: a basic approach and an advanced method. Both search methods permit the use of sophisticated and lengthy search queries to reach a high validity search result. One can search for phrases in a variety of locations on Scopus, including titles, titles/abstracts, journal names, author names, and affiliations, amongst other places. In fact, data from Scopus is used by both Times Higher Education and QS World Universities to design and apply their ranking systems for universities all over the world [10]. It is well-known that the Scopus database indexes publications from high-quality journals that have effective peer review mechanisms and editorial oversight. This contributes to the database’s global credibility.

We construct the search query in order to do an advanced search within the Scopus database. The following search query was conceived up and utilized in the investigation: (TITLE (covid-19 OR sars-cov-2 OR coronavirus OR 2019-ncov OR covid-19 OR coronavirus-19 OR “Coronavirussdisease” OR coronaviruses OR “COVID 19” OR covid19 OR severe acute respiratory syndrome coronavirus 2” OR sarscov2 OR sarscov OR “Wuhan virus” OR “Wuhan coronavirus” OR “coronavirus” OR beta coronaviruses OR “coronavirusinfections”) AND AFFILCOUNTRY (malaysia)) AND PUBYEAR > 2019 AND PUBYEAR < 2023. Any COVID-19 document indexed between January 1, 2020, and August 26, 2022, with at least one author affiliated with a Malaysian research institution, including universities, was eligible. There were no language restrictions, and all article types were included. Documents that did not match the inclusion criteria were excluded. Contributions from researchers of Malaysian origin who do not list a Malaysian affiliation on their COVID-19 article are not considered contributions from Malaysia. Y.A Adebisi extracted data from Scopus on August 26, 2022, and T.F Aroyewun and S.O Olaleye validated its accuracy. To ensure that the search queries matched the inclusion criteria, they were examined against the top 100 COVID-19 papers in Malaysia. This method was utilized to exclude potentially misleading data by deleting documents that were not about COVID-19 and do not have a Malaysian affiliation. The Scopus database data was transferred to Microsoft Excel. Bibliometric items, Scopus hierarchical classification, document types, active authors and institutions, journals, and funding agencies were all included in the exported data. Descriptive statistics were employed in analyzing the data.

3. Results and discussion

It is more than two years since the declaration of COVID-19 as pandemic. Between January 1, 2020, and August 26, 2022, a total number of COVID-19 related articles obtained by using the search query without specification of country’s name were 392,613. This figure represents worldwide research outputs on COVID-19. Total contribution by the eleven SEA countries is 16,466. Malaysian’s contribution to COVID-19 research is 0.9% and 21.6% globally and in Southeast Asia respectively. Indonesia, Malaysia and Singapore are the three highest scientific institutions in terms of contributions to COVID-19 research. More details can be found in Table 2. Nine out of the ten research institutions in terms of contributions to COVID-19 research are Malaysian universities. University of Malaya, Universiti Sains Malaysia and Universiti Kebangsaan Malaysia occupy the first, second and third position with 466 documents (4,920 citations), 380 documents (3,065 citations) and 362 documents (3,942 citations) respectively. The only non-academic institution is Kementerian Kesihatan Malaysia with 169 publications and 894 citations. It is worthy to note that there may be correlation between funding bodies and the top 10 research institutions based on research output as seven funding sponsors made the list of the institution based on scientific contribution. More details can be found in Table 2. These institutions have high collaboration between non-Malaysian countries. However, majority of the collaborations are with researchers outside SEA, most are from the UK (n = 461), Australia (385) and India (n = 355). Previous efforts revealed that nations with scientific collaboration (both local and international) tend to produce scientific publications with more impact than countries that close their doors to collaboration [11].

![COVID-19 Research Outputs in Southeast Asian Countries](image-url)
A summary of scientific documents on COVID-19 research in all topic areas that have at least one Malaysian research institution affiliation (January 1st, 2020, to August 26th, 2022).

| Database Summary | Total (January 1st, 2020, to August 26th, 2022) |
|------------------|-----------------------------------------------|
| Total documents  | 3,553                                         |
| Total citations  | 30,995                                        |
| Cited documents  | 2,125                                         |
| Average citations| 15                                            |
| **Document Type**| **Number**                                    |
| Article/original research | 2,382 (67.0%) |
| Review            | 411 (11.6%)                                   |
| Conference paper  | 294 (8.3%)                                    |
| Letter            | 243 (6.8%)                                    |
| Note              | 83 (2.3%)                                     |
| Book chapter      | 55 (1.5%)                                     |
| Editorial         | 48 (1.4%)                                     |
| Erratum           | 13 (0.4%)                                     |
| Data paper        | 11 (0.3%)                                     |
| Short Survey      | 9 (0.2%)                                      |
| Book              | 3 (0.08%)                                     |
| Retracted         | 1 (0.03%)                                     |

**Top 10 Funding Sponsor**

| Number of Output Funded |
|--------------------------|
| Ministry of Higher Education, Malaysia | 147 |
| Universiti Sains Malaysia | 71  |
| Universiti Kebangsaan Malaysia | 63  |
| Universiti Malaya | 49  |
| Kementerian Keihatan Malaysia | 41  |
| Universiti Teknologi Malaysia | 37  |
| Universiti Teknologi MARA | 36  |
| National Institutes of Health | 29  |
| Universiti Putra Malaysia | 26  |
| National Natural Science Foundation of China | 23  |

**Top 10 Research Institutions Based on COVID-19 outputs**

| Number of publications (number of document citations) |
|------------------------------------------------------|
| University of Malaya | 466 (4,920) |
| Universiti Sains Malaysia | 380 (3,065) |
| Universiti Kebangsaan Malaysia | 362 (3,942) |
| Universiti Putra Malaysia | 257 (2409) |
| Universiti Teknologi MARA | 223 (616) |
| Monash University Malaysia | 200 (1300) |
| International Medical University | 193 (1,385) |
| Kementerian Keihatan Malaysia | 169 (804) |
| Universiti Teknologi Malaysia | 128 (966) |
| Universiti Malaysia Sabah | 122 (726) |

The top 10 journals that published COVID-19 research in Malaysia were shown in Table 3. The International Journal of Environmental Research and Public Health published the highest number of articles (96 publications). PLOS One and Medical Journal of Malaysia published 54 publications and 52 publications respectively. Only 30% of the journals are local, one of the local journals occupied the third position. A prior study showed that medical professionals perceived that publishing in foreign journals was more important than publishing in local journals. Their main reason is usually to reach wider readership coverage [12].

4. Limitations

The COVID-19 publications used in this study were only limited to those available in Scopus database from January 1, 2020, to August 26, 2022. We depended on high-quality data, reliable publication coverage and complete records in Scopus database. This analysis still reflected most of the relevant literature in COVID-19 research in Malaysia. Despite this limitation, this study still showed the research pattern, gaps and future directions in the field of topic in Malaysia.

5. Conclusion

Malaysian institutions are active contributors to COVID-19 research in SEA. However, there is need to improve global research contribution in the field. Although, it is obvious from the study that Malaysian institutions have huge research capacity and government is investing in research and development, there is need for continuous efforts on this to foster the country’s development map and knowledge driven approach to curb the dreadful pandemic.

**Annals of medicine and surgery**

The following information is required for submission. Please note that failure to respond to these questions/statements will mean your submission will be returned. If you have nothing to declare in any of these categories then this should be stated.

**Ethical approval**

Not Required.

**Please state any sources of funding for your research**

None.

**Author contribution**

All the authors contributed equally to this paper and approved it for publication.

**Registration of research studies**

1 Name of the registry: Not Applicable
2 Unique Identifying number or registration ID: Not Applicable
3 Hyperlink to your specific registration (must be publicly accessible and will be checked): Not Applicable

**Guarantor**

Yusuff Adebayo Adebisi.
**Consent**

Not required.

**Declaration of competing interest**

None.

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Table 3

Top 10 Journals where COVID-19 documents with at least a Malaysian research institution affiliation, from January 1st, 2020, to August 26th, 2022, were published.

| Top 10 Journals where COVID-19 documents with at least a Malaysian research institution affiliation, from January 1st, 2020, to August 26th, 2022, were published | Number of COVID-19 document published |
| --- | --- |
| International Journal of Environmental Research and Public Health | 96 |
| PLOS One | 54 |
| Medical Journal of Malaysia | 52 |
| Sustainability Switzerland | 46 |
| Frontiers In Public Health | 44 |
| Malaysian Journal of Medicine and Health Sciences | 38 |
| Asia Pacific Journal of Public Health | 35 |
| Frontiers In Psychology | 35 |
| Lecture Notes in Networks and Systems | 31 |
| Malaysian Journal of Medical Sciences | 31 |

Top 8 active authors in COVID-19 papers in Malaysia (Rank)

| Top 8 active authors in COVID-19 papers in Malaysia (Rank) | Number of Documents (Affiliation) |
| --- | --- |
| Kow, C.S. (1st) | 112 (Monash University Malaysia, Bandar Sunway, Malaysia) |
| Haque, M. (2nd) | 42 (National Defense University of Malaysia, Unit of Pharmacology, Kuala Lumpur, Malaysia) |
| Ramachandram, D.S. (3rd) | 30 (Monash University Malaysia, School of Pharmacy, Bandar Sunway, Malaysia) |
| Alias, H. (4th) | 26 (Universiti Malaya, Department of Social and Preventive Medicine, Kuala Lumpur, Malaysia) |
| Peariasamy, K.M. (5th) | 22 (Kementerian Kesihatan Malaysia, Institute for Clinical Research, Putrajaya, Malaysia) |
| Wong, L.P. (5th) | 22 (Universiti Malaya, Kuala Lumpur, Malaysia) |
| Chellappan, D.K. (6th) | 21(International Medical University, Kuala Lumpur, Malaysia) |
| Marzo, R.R. (7th) | 20 (Monash University Malaysia, Bandar Sunway, Malaysia) |
| Jeffree, M.S. (8th) | 18 (Universiti Malaysia Sabah, Kota Kinabalu, Malaysia) |

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**Fig. 2.** Collaboration between Malaysian institutions and top 10 non-Malaysian countries in scientific output on COVID-19.