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UNDERSTANDING WEDGE RESECTION RESEARCH PRODUCTIVITY WITH VISUALIZATION: A SCIENTOMETRIC ATTITUDE

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SUMMARY

This research paper presents a scientometric analysis of wedge resection research productivity. The study aims to evaluate the evolution and different types of literature on wedge resection, identify the principal countries, institutions, and sources that have contributed to publications on wedge resection, track the increase of literature on wedge resection citations each year, and determine the most frequently discussed topics in wedge resection research publications. To achieve these objectives, the study utilized a scientometric approach that involved a systematic analysis of existing research on wedge resection and productivity, with a focus on the application of scientometric methods. The results of the analysis provide a comprehensive examination of wedge resection productivity, which can be used to guide future research in the field. The study demonstrates the potential of scientometric methods in examining research output and productivity in various fields, including wedge resection. Overall, this research paper provides valuable insights into wedge resection productivity that can inform future research and decision-making in the field.

Keywords: Wedge resection, Scientometric, Research Productivity, Science mapping

INTRODUCTION

Wedge resection, a surgical procedure that involves the removal of a wedge-shaped portion of an organ, such as the lung or liver, is widely used to treat cancer and other conditions. In order to advance our understanding of this procedure and its impact in the field of healthcare, it is essential to examine the volume, impact, and patterns of scientific literature on wedge resection (5).

Scientometric studies provide a valuable tool for this purpose, as they use statistical and mathematical methods to analyze scientific literature (2). The results of these studies can provide valuable insights into the development and evolution of wedge resection over time, as well as identify the most commonly used techniques, the countries and institutions leading the research, and the challenges and controversies surrounding the procedure (15).

The purpose of this research article is to present a scientometric analysis of the literature on wedge resection (10). The study aims to address the following research questions: What is the overall trend of publications on wedge resection? Who is the leading institution in this field? What are the most frequently used keywords and topics in the literature on wedge resection (14)?

The results of this scientometric analysis will provide valuable information for researchers, clinicians, and policy makers in the field of healthcare, by highlighting the most important and impactful studies, authors, and institutions in the field of wedge resection (13). This study will also contribute to our understanding of the development and evolution of this important surgical procedure, and provide valuable insights into areas where further research is needed to enhance the science.

LITERATURE REVIEW

The topic of wedge resection and productivity has not received much attention in existing literature. To address this gap, this literature review suggests the use of scientometric methods to analyze existing research in this field.

Previous studies have utilized scientometric approaches to analyze research output in various fields. Sangam et al. (2014) conducted a research output analysis of genetics research in 10 Asian nations using the Research Priority Index to compare countries across borders. Li et al. (2021) provided a comprehensive overview of the topic based on annual documents, research fields, organizations, significant authors, and temporal trends in keyword usage. The journal Remote Sensing has been identified as a popular venue for researchers to publish their work related to genetics research projects.

Similarly, Gupta and Dhawan (2018) conducted an analytical study of 7309 articles indexed in the Scopus database over a ten-year period from 2007 to 2016 to provide a quantitative and qualitative account of three-dimensional (3D) printing research. Kumar and Malarvizhi (2022) counted the total number of research papers on the monkey B virus published over a nine-decade period using the Scopus database. They found that the articles published on the monkey B virus varied in terms of scientometric indicators and research content.

Overall, this literature review highlights the potential for scientometric methods to provide valuable insights into research output and productivity in various fields, including wedge resection. While no significant studies have been published on this topic, utilizing scientometric approaches may provide a more comprehensive understanding of the research in this field.

STUDY OBJECTIVE

The objectives of a scientometric analysis of wedge resection productivity formulated as follows:

- To assess the development and kind of the literature on wedge resection.
- Find out productive literature sources of Wedge resection.
- To identify the significant nations, organisations and sources that have contributed to publications on wedge resection.
- Identify collaboration.
- To track the literature on Wedge resection's annual growth in citations.
- To determine the popular keywords for research papers.

METHODOLOGY

The PubMed database provided the information for this investigation. Predictive analytics was done using an R-based library. The PubMed database, which covers the years 1990 to 2022, was used to retrieve and download the data for the current study in Wedge resection research. There were search terms, "Wedge resection" mentioned to gathered data. The study's data were generated on February 18, 2023.

Query to data retrieved
"wedge resection"[Title/Abstract]
AND "english"[Language] AND "journal
article"[Publication Type] AND
1990/01/01:2022/12/31[Date - Publication]

DISCUSSION

The data covers a timespan from 1990 to 2022 and includes 750 sources, such as journals and books, and 3117 documents. The annual growth rate of the documents is 5.18%, and the average document age is 12.1 years. The figure also shows that the average number of citations per document is zero and that there is one reference.

The document contents are described in terms of keywords, including 2775 Keywords Plus and 2698 Author's Keywords. There are 12499 authors and 91 authors of single-authored documents, with an average of 5.91 co-authors per document. The figure also indicates that there are no international co-authorships.

The document types listed include biography, case reports, clinical studies and trials, comparative studies, editorial, evaluation studies, guidelines, historical articles, journal articles, observational studies, randomized controlled trials, and reviews. Most of the documents are journal articles, with 1982 in total.

Figure 1 *- Data Synthesis*

The graph displays the number of articles published each year from 1990 to 2022. The x-axis represents the year, while the y-axis represents the number of articles published in that year. The graph shows that the number of articles published has generally been increasing over time, with a few fluctuations (4). The number of articles published was relatively low in the early 1990s, but has increased steadily since then. The graph also shows a peak in the number of articles published in 2017, with a total of 185 articles published in that year. The number of articles published in 2020 and 2021 are also relatively high, with 196 and 197 articles published, respectively. The graph suggests that the research in the field has been growing steadily over time.

In 1990, there were 26 articles published, which increased to 15 in 1991, 36 in 1992, and 43 in 1993. The number of articles continued to increase until it reached its peak of 197 in 2021, after which it decreased to 131 in 2022 (11) . The number of articles published varied from year to year, with some years having a higher number of articles than others. The number of articles published in a year may be influenced by various factors, such as the popularity of a topic, the availability of funding, and the number of researchers working on a particular subject.

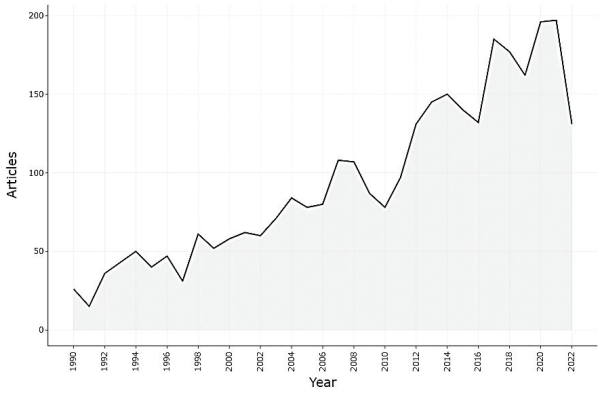

Figure 2 *- Year wise literature production*

This graph (Figure: 3) includes sources and the number of articles published in each source. The sources are listed in descending order based on the number of articles they have published. The source with the highest number of articles published is "THE ANNALS OF THORACIC SURGERY," which has published 155 articles, followed by "JOURNAL OF THORACIC DISEASE" with 112 articles, and "EUROPEAN JOURNAL OF CARDIO-THORACIC SURGERY" with 110 articles.

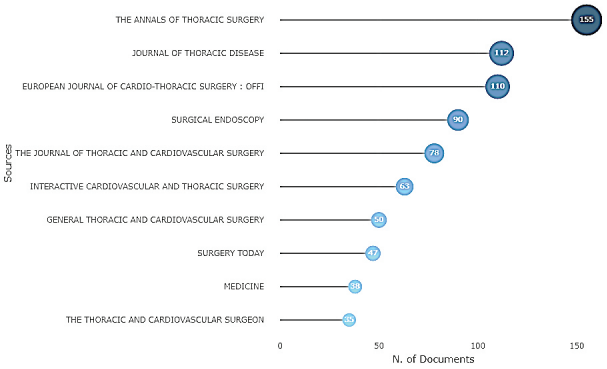

Figure 3 *- Productive Source*

The graph (Figure 4) appeared to be a summary of the results of applying Bradford's Law to a set of scientific journals, method for organizing and grouping scientific articles or literature sources based on the number of articles published in each journal. Bradford's Law proposes that the number of articles published in a journal can be described by the equation N = K/r^b, where N is the number of articles published, K is a constant, r is the rank of the journal, and b is a constant that represents the Bradford factor. Based on this equation, Bradford's law proposes that the distribution of articles across scientific journals can be divided into three zones:

1. Zone 1: This is the core group of highly productive journals that account for a large percentage of the total number of articles published.
2. Zone 2: This is the group of moderately productive journals that account for a smaller percentage of the total number of articles published.
3. Zone 3: This is the group of less productive journals that account for a relatively small percentage of the total number of articles published.

The results in the graph seem to support the idea of dividing the distribution of articles into these three zones, within the 18 journals fall into Zone 1 ; the first two journals in the graph (THE ANNALS OF THORACIC SURGERY and JOURNAL OF THORACIC DISEASE) being assigned to Zone 1 is highly productive journals.

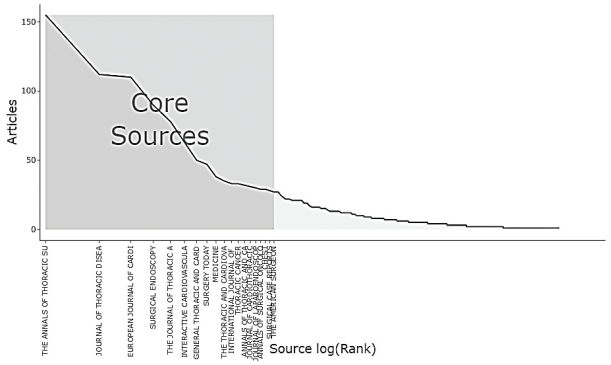

Figure 4 *- Bradford's Productivity*

The graph (Figure 5) provided describes the number of articles associated with different affiliations. The affiliations

listed are institutions such as universities or hospitals. DEPARTMENT OF THORACIC SURGERY KYOTO UNIVERSITY HOSPITAL KYOTO JAPAN has the highest number of articles with 53, while the DEPARTMENT OF ONCOLOGY SHANGHAI MEDICAL COLLEGE FUDAN UNIVERSITY SHANGHAI CHINA has 45 articles. The affiliations come from different countries.

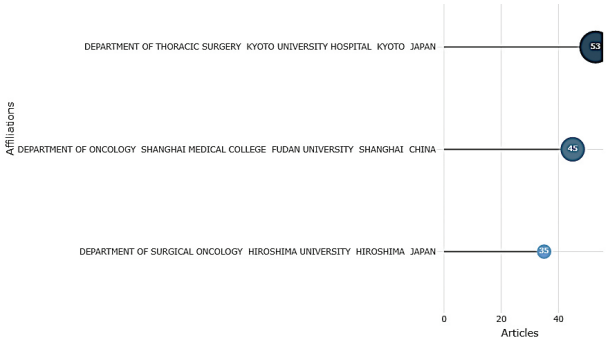

Figure 5 *- Productive Institutions*

The information (Figure. 6) appeared to show the frequency of collaboration between different countries in terms of scientific research. The data is presented in the form of a graph, representing a pair of countries and the frequency of collaboration between them.

Based on the data, it appears that China has the highest number of collaborations with other countries, with a total of 24 collaborations across 13 different countries. The countries that China collaborated with the most are Japan and the United States, with 6 collaborations each (16).China also collaborated with Germany and Spain 5 times each.

It is also interesting to note that some countries have only one collaboration shown in the data graph, indicating that they may not have extensive research collaborations with other countries in the dataset. For example, Lebanon, Norway, and Iraq each have only one collaboration.

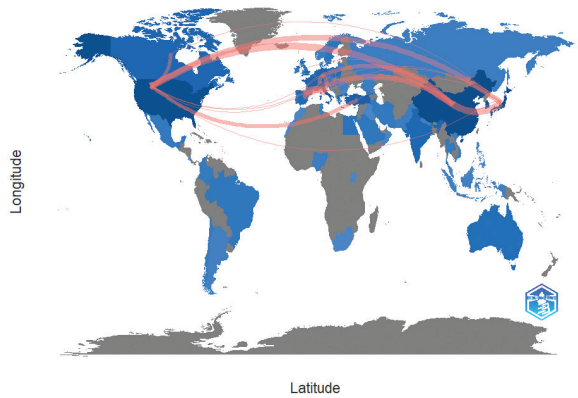

Figure 6 *- Country Collaboration*

The data in the can be used to explore the relationship between the number of documents written by an author and the proportion of authors who have written that many documents.

As shown in the graph data, the numbers of authors who have written a given number of documents decrease rapidly as the number of documents written increases. For example, the number of authors who have written only one document is 9962, which is about 8 times larger than the number of authors who have written two documents (1366) (12). The number of authors who have written three documents is even smaller, at 488, and continues to decrease as the number of documents written increases.

In addition, the proportion of authors who have written a given number of documents also decreases rapidly as the number of documents written increases. For instance, the proportion of authors who have written only one document is 0.797 or 79.7%, which is much larger than the proportion of authors who have written two documents (0.109 or 10.9%). The proportion of authors who have written three documents is even smaller, at 0.039 or 3.9%, and continues to decrease as the number of documents written increases (7).

The graphical representation is consistent with Lotka's Law, which suggests that the productivity of authors follows a power law distribution. Lotka's Law implies that a small number of authors produce a large proportion of the total output, while the majority of authors produce only a small fraction of the output. The data in the graph supports this pattern of productivity, with a small number of authors responsible for producing a large proportion of the total output(1) .

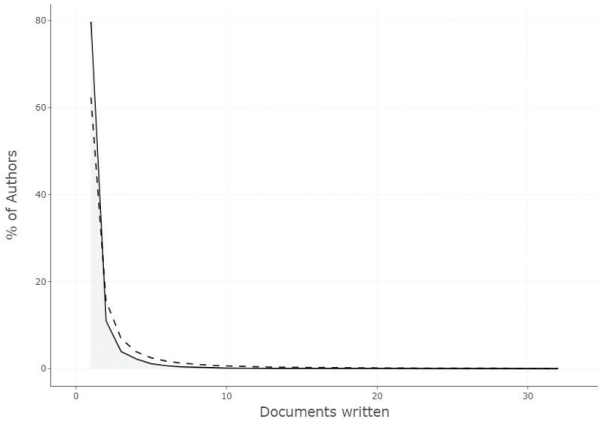

Figure 7 *- Lotka's Law's Application to Author Productivity*

The visualization shows the number of occurrences for certain words in a set of scientific papers over a period of 32 years (from 1990 to 2022). The words are related to the medical field, particularly to the study of Wedge resection.

The words listed in the graph are: HUMANS, FEMALE, MALE, MIDDLE AGED, AGED, ADULT, LUNG NEOPLASMS, RETROSPECTIVE STUDIES, TREATMENT OUTCOME, and PNEUMONECTOMY.

In 2022, the word "HUMANS" appears 2500 times, the word "FEMALE" appears 1738 times, the word "MALE" appears 1570 times, and so on.

The visualization provides insight into the use keywords of scientific research on Wedge resection.

Different colour and solidity visualization represent rapidly use keywords on the literature.

The graph shows a dataset of publication counts for various topics over a period of 33 years, from 1990 to 2022. A representation of different keywords - "HUMANS", "FEMALE", "MALE", "MIDDLE AGED", "AGED", "ADULT", "LUNG NEOPLASMS", "RETROSPECTIVE STUDIES", "TREATMENT OUTCOME", and "PNEUMONECTOMY".

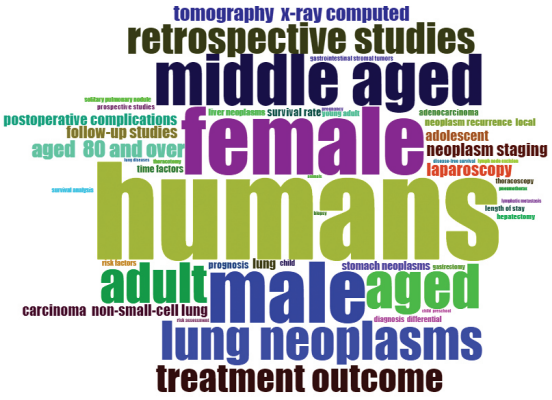

Figure 8 *- WordCloud*

The vitalization represent the years from 1990 to 2022. In 2022, there were 2500 publications indexed with the "HUMANS" category, 1738 indexed with "FEMALE", 1570 indexed with "MALE", 997 indexed with "LUNG NEOPLASMS", and so on.

This graphical presentation used to show trends in publication counts over time for various categories. For case in point, there has been a steady increase in the number of publications indexed with "HUMANS" over the years. Similarly, there has been a general increase in the number of publications indexed with "FEMALE" and "MALE" categories as well.

The graph used to compare the number of publications across different categories in a given year. In 2022, there were more publications indexed with "FEMALE" than with "MALE", and there were more publications indexed with "LUNG NEOPLASMS" than with "PNEUMONECTOMY".

Overall, this visualized graph provides a snapshot of the trends in publication counts for various terms over a 33-years period, which can be useful for understanding the research landscape and identifying potential areas for further investigation.

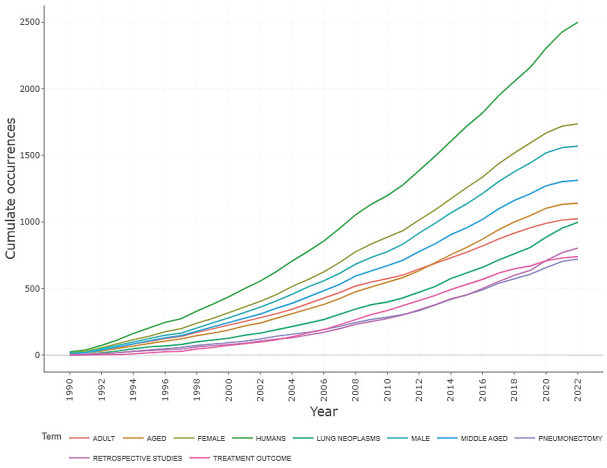

Figure 9 *- 9: Dynamics growth of words*

CONCLUSION

After analysing the thematic evolution and author productivity of wedge resection-related research using Bradford's Law and Lotka's Law, we can conclude that this topic has seen significant growth and diversification over the years. The analysis suggests that plastic surgery procedures, patient satisfaction, and surgical flaps are currently popular areas of research related to wedge resection. Meanwhile, there has been a steady increase in the number of studies focused on thoracic surgery, lung diseases, and young adult patients.

The study of author productivity using Lotka's Law shows that a small number of highly productive authors have contributed a significant portion of the literature on wedge resection. This information could be valuable for identifying key experts and collaborators in this field.

Overall, this scientometric approach provides insights into the trends and patterns of wedge resection research, which can inform future research direction, funding allocation, and policy decisions.

In conclusion, the scientometric approach used to analyze wedge resection productivity has shed light on various aspects of this surgical technique, including its historical evolution, current research trends, and the key contributors to the field. The study has revealed that wedge resection has gained significant importance over the years as a preferred surgical method for treating various lung diseases, including lung cancer. The analysis of the scientific literature has shown an increasing trend in the number of publications related to wedge resection, indicating a growing interest in this field. Overall, the scientometric analysis of wedge resection productivity provides a valuable insight into the trends and advancements of this surgical technique. The findings of this study can serve as a guide to researchers, institutions, and policymakers in identifying areas that require further research and investment. This can aid in improving patient outcomes and advancing the field of thoracic surgery.

REFERENCES

1. Babbar, P., et al. "Metrics, Indicators, Mapping and Data Visualizations in Webometrics, Informetrics and Scientometrics." Researchgate.Net, no. Query date: 2023-02-13 17:15:13, https://www.researchgate.net/profile/Gyanajeet-Yumnam/publication/366064388_Breast_Cancer_Research_of_India_during_2012-2021_A_Scientometric_Study/links/63901ae4095a6a77740c832c/Breast-Cancer-Research-of-India-during-2012-2021-A-Scientometric-Study.pdf.
2. Cai, R., and J. Guo. "Finance for the Environment: A Scientometrics Analysis of Green Finance." Mathematics, no. Query date: 2023-02-13 17:15:13, 2021, https://www.mdpi.com/1173052.
3. Chansanam, W., and C. Li. "Scientometrics of Poverty Research for Sustainability Development: Trend Analysis of the 1964–2022 Data through Scopus." Sustainability, no. Query date: 2023-02-13 17:15:13, 2022, https://www.mdpi.com/2071-1050/14/9/5339.
4. Das, S., and MK Verma. "Authorship and Collaboration Pattern of Annals of Library and Information Studies Journal during 2009-2018: Scientometrics Mapping." LibrPhilosPract [Internet], no. Query date: 2023-02-13 17:15:13, 2021, https://www.researchgate.net/profile/Manoj-Verma-16/publication/352372394_Authorship_and_Collaboration_Pattern_of_Annals_of_Library_and_Information_Studies_Journal_during_2009-2018_Scientometrics_Mapping/links/60c9e714458515dc1785a45f/Authorship-and-Collaboration-Pattern-of-Annals-of-Library-and-Information-Studies-Journal-during-2009-2018-Scientometrics-Mapping.pdf.
5. Errett, Lee E., et al. "Wedge Resection as an Alternative Procedure for Peripheral Bronchogenic Carcinoma in Poor-Risk Patients." The Journal of Thoracic and Cardiovascular Surgery, vol. 90, no. 5, 1985, pp. 656–661., doi:10.1016/s0022-5223(19)38531-9.
6. Gu, Z., et al. "Mapping the Research on Knowledge Transfer: A Scientometrics Approach." IEEE Access, no. Query date: 2023-02-13 17:15:13, 2021, https://ieeexplore.ieee.org/abstract/document/9360736/.
7. Jiang, Xue, et al. "The Development and Future Frontiers of Global Ecological Restoration Projects in the Twenty-First Century: A Systematic Review Based on Scientometrics." Environmental Science and Pollution Research, 2023, https://doi.org/10.1007/s11356-023-25615-3.
8. Li, T., et al. "Quantitative Analysis of the Research Trends and Areas in Grassland Remote Sensing: A Scientometrics Analysis of Web of Science from 1980 to 2020." Remote Sensing, no. Query date: 2023-02-13 17:15:13, 2021, https://www.mdpi.com/1050616.
9. Mate, YD, et al. "Patent Literature in Astronomy and Astrophysics Subject Area: Scientometrics Analysis." Kalaharijournals.Com, no. Query date: 2023-02-13 17:15:13, https://kalaharijournals.com/resources/SP-Vol.6_80.pdf.
10. Parabhoi, L., and MK Verma. "Coronavirus Research Output during 2001-2020: A Scientometrics Analysis." Library Philosophy and Practice, no. Query date: 2023-02-13 17:15:13, 2020, https://www.researchgate.net/profile/Manoj-Verma-16/publication/346646762_Coronavirus_research_output_during_2001-2020_A_Scientometrics_Analysis/links/5fdb2135a6fdccdcb8d1d181/Coronavirus-research-output-during-2001-2020-A-Scientometrics-Analysis.pdf.
11. Probowulan, D., and H. Tjaraka. Tax Avoidance Landscape Scheme: Scientometrics Analysis Using Biblioshiny. no. Query date: 2023-02-13 17:15:13, 2022, https://www.researchsquare.com/article/rs-2067998/latest.pdf.
12. Rahaman, MS, et al. "Scientometrics Profile of the Banasthali Vidyapith: A Deemed University of Rajasthan, India." … and Practice (e …, no. Query date: 2023-02-13 17:15:13, 2020, https://www.academia.edu/download/66093859/Scientometrics_Profile_of_the_Banasthali_Vidyapith_A_Deemed_University_of_Rajasthan_India.pdf.
13. Sankar, M., and S. Raju. "Corona Virus Research in Veterinary Science a Scientometrics Analysis." International Journal of Library and Information Studies, no. Query date: 2023-02-13 17:15:13, 2021, https://www.ijlis.org/articles/corona-virus-research-in-veterinary-science-a-scientometrics-analysis-86846.html.
14. Sebastiyan, R., V. Rameshbabu, and TM Surulinathi. "Mapping of the Research Output in Food Economics: A Scientometrics View of the Scopus Database." Jusst.Org, no. Query date: 2023-02-13 17:15:13, https://jusst.org/wp-content/uploads/2021/11/Mapping-of-the-Research-Output-in-Food-Economics-A-Scientometrics-View-of-the-Scopus-Database.pdf.
15. Sebastiyan, R., et al. "Research Performance Of Global Scholars On Food Economics: A Scientometrics Vision ." Webology, vol. 18, no. 3, 2021, pp. 908–924.
16. Sivankalai, S, Ashok Kumar, P, Sharmila, M , Rosy Malarvizhi, S . Daniel, D , Sivasekaran, . "Scientometrics Visualization Of Monkey B Virus: Status, Development, And Research Directions". Journal of Pharmaceutical Negative Results, Dec. 2022, pp. 5325-36, doi:10.47750/pnr.2022.13.S09.652.
17. Sivankalai, S., and K. Sivasekaran. "Mucormycosis (Black Fungus) Maiming Covid Patients: Scientometrics Analysis through Prism of Biblioshiny." Libr Philos Pract, no. Query date: 2023-02-13 17:15:13, 2021, https://www.researchgate.net/profile/Sivankalai-Sivankalai/publication/352674452_Mucormycosis_Black_Fungus_Maiming_Covid_Patients_Scientometrics_analysis_through_prism_of_Biblioshiny/links/6103b82a1e95fe241a99a71c/Mucormycosis-Black-Fungus-Maiming-Covid-Patients-Scientometrics-analysis-through-prism-of-Biblioshiny.pdf.