

## Visualization of Research Publications on Kappa Virus Using R Software: Seventy-one years appraisal of scientometrics review

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### Abstract:

**Introduction:** This article provides scientific research analysis and representation of the worldwide research on kappa viruses. However, the issue is that the lengthiest study in the field of the Kappa virus has taken place. The study intends to monitor the current condition of kappa virus research by utilising network analysis and viewing of publications on kappa virus. **Methods:** During the period from 1950 to July 2021, 10624 releases were retrieved from the Scopus database. For data analysis, R statistical software and MS-Excel applications are utilised. Different findings are derived from the yearly scientific production, Type of Documents, country corresponding production, The Three-field Plot: Analysis of the Left Sources-Middle Authors and the Funding Sponsor, and Co-citation of the Network of Sources Analysis. **Results:** The highest percentage (86.90%) of Kappa Virus publications are articles. USA (3148) and China (1575) are the most publication of countries and authors per document is 4.14. The findings reveal that China and the United States are at the heart of Kappa virus research networks at each of the three tiers. **Conclusion:** The study shows how governments, the public sector, and private sectors, such as the pharmaceutical industry, can use scientific analysis to gain insights into the holistic trends of research and players' networks in this field, leading to strengthened research and development strategies programmes. In addition, this method may be used for future policy planning, identifying, and executing cooperation and research exchange possibilities as a means of visualisation and decision assistance. This procedure should apply directly to other areas.

**Keywords:** Kappa Virus, Scientometrics, Co-citation Network, Biblioshiny, Three-Fields Plot

### Introduction

The catastrophic second wave of the COVID-19 epidemic has progressively eradicated cities throughout India and focuses on vaccination to achieve immunity of herds. The deadly SARS-CoV-2 coronavirus, however, continues to outdate science and alarming specialists are new transmissible varieties. India reported two Kappa instances on Friday. In Uttar Pradesh,

both instances are. It was found at the King George Medical College in Lucknow during a genomic sequence of 109 samples. One of the patients, a sixty-six-year-old man, died and caused people to worry. It is not the Kappa new. It has been connected to the B.1.617 mutations constellation; this has been around for some time in India for the first time. It is B.1.167.1. In October, it was superseded by version B.1.167.2 or Delta. The WHO called it the Kappa variant towards the end of May. This variation has been discovered to have more than a dozen mutations, two of them E484Q and L452R. Kappa is also known as a 'double mutant' because of this.

Health professionals oversee the L452R mutation since it lets the virus evade normal immune reactions from the body. The GISAID headquartered in Munich, which maintains an international coronavirus genome database, shows that India has presented 3,693 Kappa samples to the highest in the globe. India has presented two samples of the variation during the last four weeks. The Kappa variation in a variety of interests is characterized by WHO (VOI). This is a variant of SARS-CoV-2. The genetic modification anticipated or impacts viral traits, such as transmissibility, severity of illness, immunological exhaust, diagnosis or treatment exhaustion. In several nations, with increased relative frequency, with a growing number of cases over time, or other obvious epidemiological consequences, such as substantial community transmission or numerous COVID-19 clusters, suggest an emergent danger to global public health. India has presented two samples of the variation during the last four weeks.

WHO has defined the Kappa variation as a kind of interest (VOI) Genetic alterations are expected or known to influence viral properties, such as transmissibility, the severity of illness, immune escape, diagnostic, or treatment escape. In many nations with rising relative frequency and increasing numbers of cases over time, substantial communal transmission or multiple COVID-19 clusters are identified as causing an evolutionary danger to global public health or other apparent epidemiological effects. To identify variations, WHO has brought several scientists and professionals to propose VOI (a variant of interest) and VOC designations that may be quickly proclaimed and not stigmatized (Variants of Concern). The committee suggested that individuals from the non-scientific sector use Greek Alphabet letters, such as Alpha, Beta, Gamma, Delta, Kappa, etc. In recent research, both covaxin and coronaviral versions of beta and Delta were efficacious by the Indian Council of Medical Research (ICMR). Some days earlier, Covaxine successfully neutralized both the Alpha and the Delta versions of the coronavirus, the United States National Institute of Health (NIH).

### **Methods and Data Collection**

The scientometric analysis method was employed in this study to achieve the predefined research objectives of evaluating the contributions of research on the Kappa Virus, exploring research interest trends, and deducing the emerging research themes. (Sivankalai, S; Sivasekaran, K 2021) define scientometric analysis as a technique that allows for a broader capture of a scientific field by identifying research frontiers and structural patterns using formulae and visualizations. Using scientometrics as a method of analysis makes it possible to determine the underlying dynamics of any scientific field and the authors, institutions, and

countries that direct the field. According to Konur, scientometric analysis is one of the most used methods to examine the development and performance of an identified research field. The leading information about data for the kappa virus provides that the researchers took part in the most significant usage of this article during the time span of 1950:2021 in table 1, the uppermost results examined by references (403379).

In contrast, documents delivered the results (10624), sources (Journals, books, etc.) found the results (2163). The 42.91 per cent belong to the average citations per document, and 11.70 percent go to the average years from publication. Finally, 3.42 percentages of the results were observed by average citations per year per document. To achieve the goal of this study, we used the as the data source. Scopus kappa virus publication data was gathered from Scopus using the query (TITLE-ABS-KEY (Kappa and Virus). There are a total of 10624 records found between the years 1950 and (July) 2021. A few scientometric analyses were carried out in this study: Summary of types of publications; Three-Fields Plot: Left Sources-Middle Authors-Affiliations; Bradford's Law; Corresponding Author's Country; Sources wise Co-citation Network that assists in capturing the shifted research interest and focus on the Kappa Virus. The findings for each period add value to this paper.

### **Data Analysis and Results:**

A summary of types of publications is provided in Figure 1. The highest percentage (86.90%) of Kappa Virus publications are articles, followed by a review that ranks second highest (8.9%). Other publications, including Conference Papers, Letters, Notes, Short Surveys, Editorials, Book Chapters, Erratum, and Retracted are of a less percentage (less than 1.22%).

**Table 1:Core Information on Kappa Virus data**

<b>Description</b>	<b>Results</b>
Timespan	1950:2021
Sources (Journals, Books, etc)	2163
Documents	10624
Average years from publication	11.70
Average citations per document	42.91
Average citations per year per document	3.42
References	403379

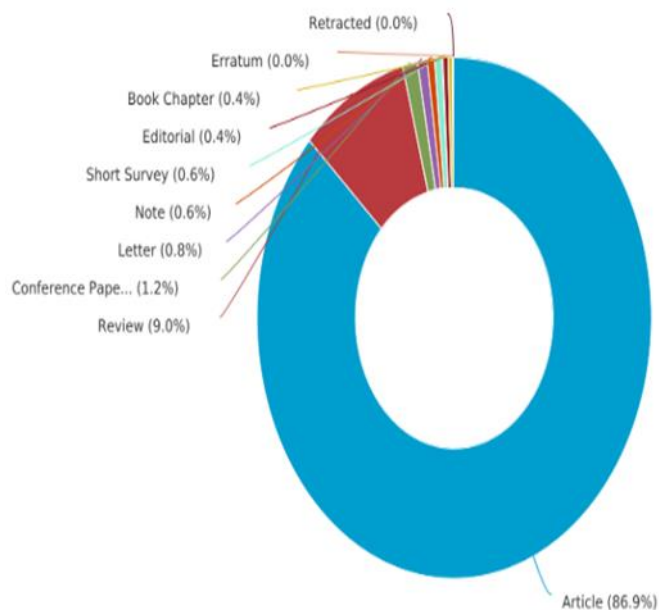


Figure 1: Summary of types of publications

**Table 2: Document Contents, Authors and Authors Collaboration**

<b>Document Contents</b>	
Keywords Plus (ID)	36072
Author's Keywords (DE)	13898
<b>Authors</b>	
Authors	43975
Author Appearances	71016
Authors of single-authored documents	315
Authors of multi-authored documents	43660
<b>Authors Collaboration</b>	
Single-authored documents	374
Documents per Author	0.24
Authors per Document	4.14
Co-Authors per Documents	6.68
Collaboration Index	4.26

**Table 3: Annual Total Citation per Year on Kappa Virus**

Year	N	Mean TC per articles	Mean TC per Year	Citable Years
1950	1	0.00	0.00	71
1951	0	0.00	0.00	0
1952	0	0.00	0.00	0
1953	0	0.00	0.00	0
1954	0	0.00	0.00	0
1955	0	0.00	0.00	0
1956	0	0.00	0.00	0
1957	1	1.00	0.02	64
1958	0	0.00	0.00	0
1959	0	0.00	0.00	0
1960	0	0.00	0.00	0
1961	0	0.00	0.00	0
1962	0	0.00	0.00	0
1963	1	6.00	0.10	58
1964	1	5.00	0.09	57
1965	1	5.00	0.09	56
1966	0	0.00	0.00	0
1967	1	7.00	0.13	54
1968	1	5.00	0.09	53
1969	0	0.00	0.00	0
1970	3	3.67	0.07	51
1971	2	33.50	0.67	50
1972	3	21.00	0.43	49
1973	6	12.00	0.25	48
1974	7	11.57	0.25	47
1975	11	55.00	1.20	46
1976	4	18.75	0.42	45
1977	5	4.20	0.10	44
1978	6	13.67	0.32	43
1979	8	39.88	0.95	42
1980	9	119.67	2.92	41
1981	9	98.33	2.46	40
1982	17	55.65	1.43	39
1983	20	34.05	0.90	38
1984	23	63.57	1.72	37
1985	23	38.17	1.06	36

Year	N	Mean TC per articles	Mean TC per Year	Citable Years
1986	19	32.37	0.92	35
1987	33	21.21	0.62	34
1988	34	46.47	1.41	33
1989	58	103.36	3.23	32
1990	60	63.28	2.04	31
1991	85	43.66	1.46	30
1992	81	87.42	3.01	29
1993	114	66.22	2.36	28
1994	133	66.77	2.47	27
1995	108	49.15	1.89	26
1996	118	67.19	2.69	25
1997	118	63.09	2.63	24
1998	137	75.73	3.29	23
1999	169	78.15	3.55	22
2000	186	74.38	3.54	21
2001	262	89.05	4.45	20
2002	254	78.97	4.16	19
2003	278	81.67	4.54	18
2004	313	72.83	4.28	17
2005	359	85.81	5.36	16
2006	377	82.14	5.48	15
2007	389	52.88	3.78	14
2008	412	50.50	3.88	13
2009	407	59.96	5.00	12
2010	407	54.52	4.96	11
2011	503	36.64	3.66	10
2012	534	36.56	4.06	9
2013	481	31.83	3.98	8
2014	519	26.75	3.82	7
2015	512	26.69	4.45	6
2016	492	17.45	3.49	5
2017	532	15.62	3.91	4
2018	505	10.52	3.51	3
2019	466	7.35	3.67	2
2020	673	7.56	7.56	1
2021	333	1.17		0

Table 2 depicts annual trends in scientific output in terms of publications. The first Kappa Virus-related publication was in 1950, and its yearly growth has been less than small since then. Between 1993 and 2020, kappa virus research gained traction, as the number of publications on the kappa virus and its offshoot fields has spread significantly. The year 2020 was the most prolific in kappa virus research, with 673 articles registered, and followed by 2012 with 534 publications and 2014 with 519 publications. Before 1974, it was the most prolific year with just one publication. We gathered data for a few (333) articles published in the past several months (January to July 2021). The total citations per article were most outstanding in 1980 and 1983 (119.67 and 103.36 per cent, respectively). The years with the highest 5.00 per cent overall citation rate per year were 2005, 2006, and 2009.

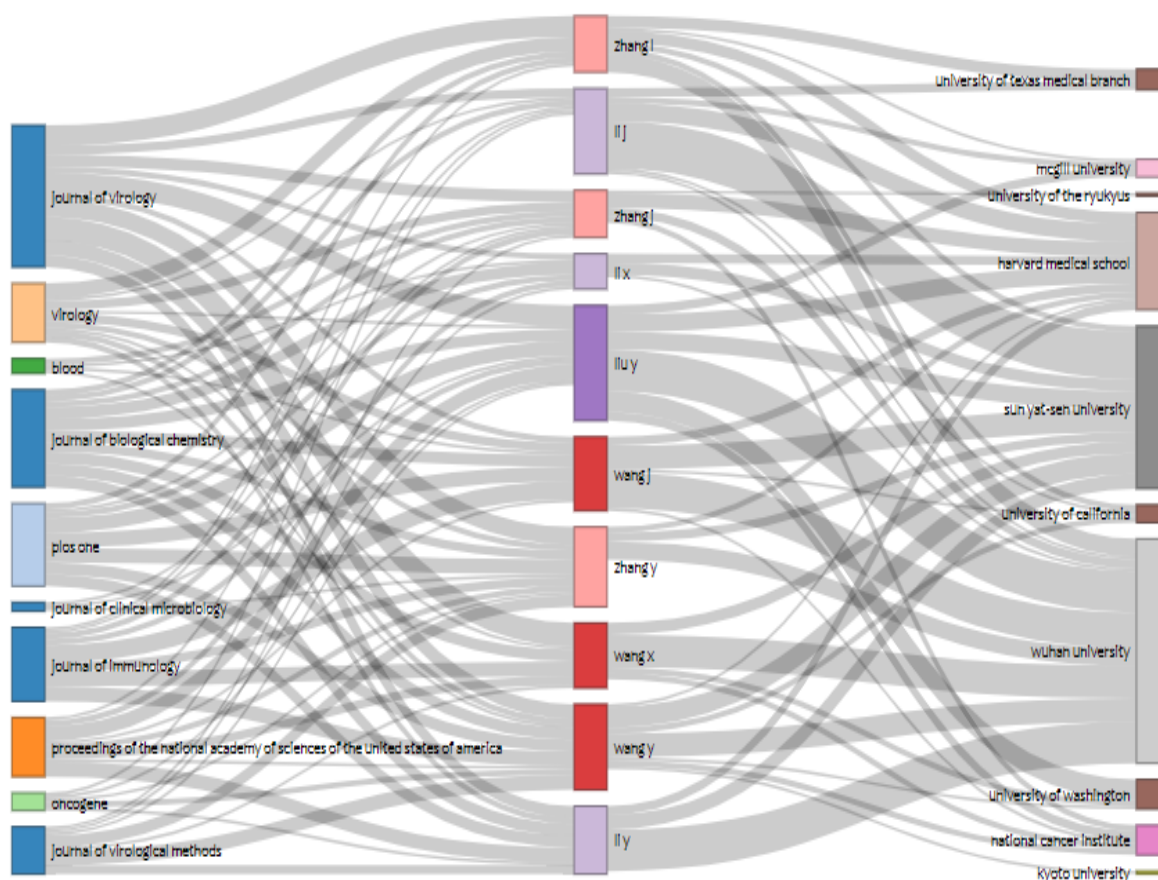


Figure 2: Three-Fields Plot: Left Sources-Middle Authors-Affiliations

Three field plot (Figure 2) gives the relationship between three fields using Sankey Plots, where the size of the portion is proportional to the value of the node (Riehm et al., 2005). On the left side of the Sankey, Plot are the sources, on the middle row are the authors, and on the right side are the affiliations that were selected for analysis. Each of the ten items depicted prominent authors like Ilu Y, Wang Y, Il J, Zhang Y, and Il Y, along with their sources and affiliations. All the ten influential journals covered the topic "Wang J", indicating its indispensable role in shaping "Wang X". "Il X", "Zhang I", and "Zhang J" emerged as important authors addressed by these influential affiliations and sources.

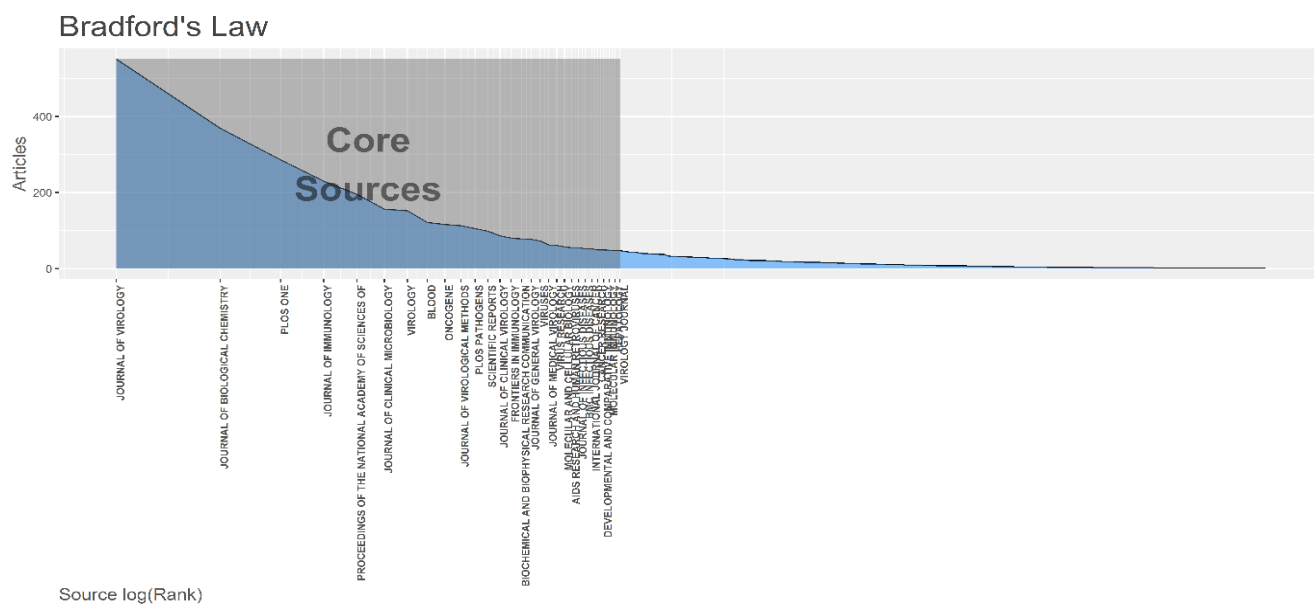


Figure 3: Kappa Virus Journals using Bradford’s Law

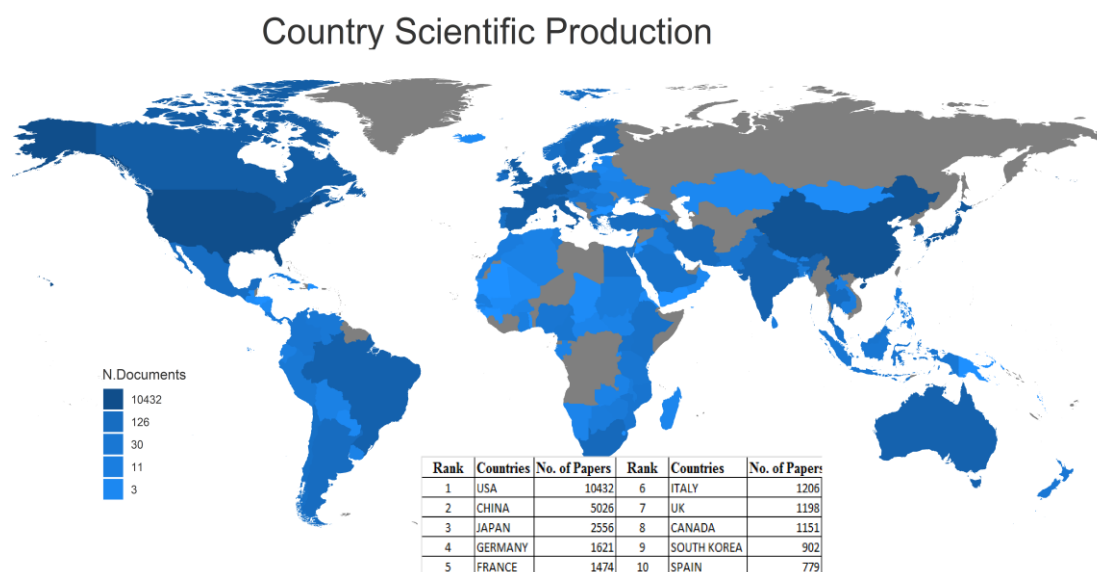


Figure 4:Scientific production by country. The map was generated through “Biblioshiny”. Different shades of blue indicate different productivity rate: dark blue = high productivity; grey = no papers

Bradford's Law of Scattering is a law that reduces revenues and disperses those (Nash-Stewart et al., 2012). (Nachrichten, 2012). "There are a few productive journals, a bigger number of intermediary producers, and a larger number with constantly declining output," Bradford et al. (1953) said. In other words, the essential and significant information for the respective topic is available to a restricted number of periodicals. By using this approach, we can divide academic journals into three zones by their number. The first zone journals are vital in this area (see Figure 3).



**Table4 :Corresponding Author's Country**

Country	Articles	Freq	SCP	MCP	MCPRatio
USA	3148	0.33	2515	633	0.20
China	1575	0.17	1329	246	0.16
Japan	680	0.07	582	98	0.14
Germany	435	0.05	288	147	0.34
France	356	0.04	238	118	0.33
Italy	352	0.04	253	99	0.28
United Kingdom	345	0.04	212	133	0.39
Canada	305	0.03	203	102	0.33
Korea	303	0.03	260	43	0.14
Spain	201	0.02	145	56	0.28
India	172	0.02	150	22	0.13
Brazil	158	0.02	132	26	0.17
Australia	138	0.01	95	43	0.31
Belgium	108	0.01	71	37	0.34
Netherlands	104	0.01	62	42	0.40
Switzerland	92	0.01	47	45	0.49
Sweden	74	0.01	39	35	0.47
Hong Kong	57	0.01	36	21	0.37
Denmark	56	0.01	37	19	0.34
South Africa	49	0.01	21	28	0.57

SCP: single country publication; MCP: multi country publication

Based on all authors' connections, the geographical distribution of publications is centred in the United States and Canada and other Asian and European nations (China, Japan, Germany, and France) (Figure 4). The most productive nations are those in Europe, where patient participation in professional procedures has been a focus since the 1950s, and new forms of organisation have emerged.

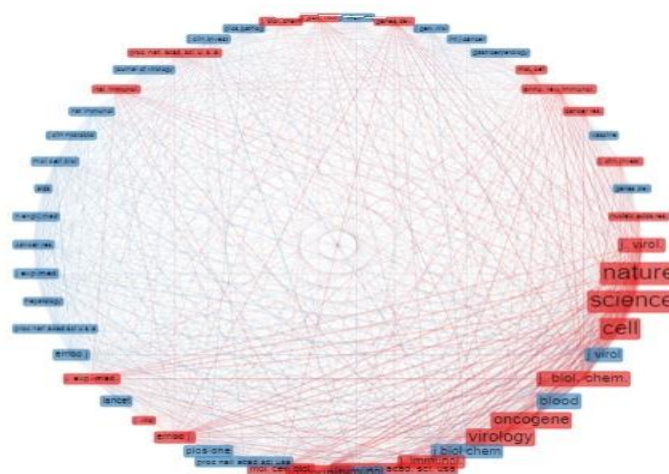


Figure 5 :Co-citation Network analysis of sources

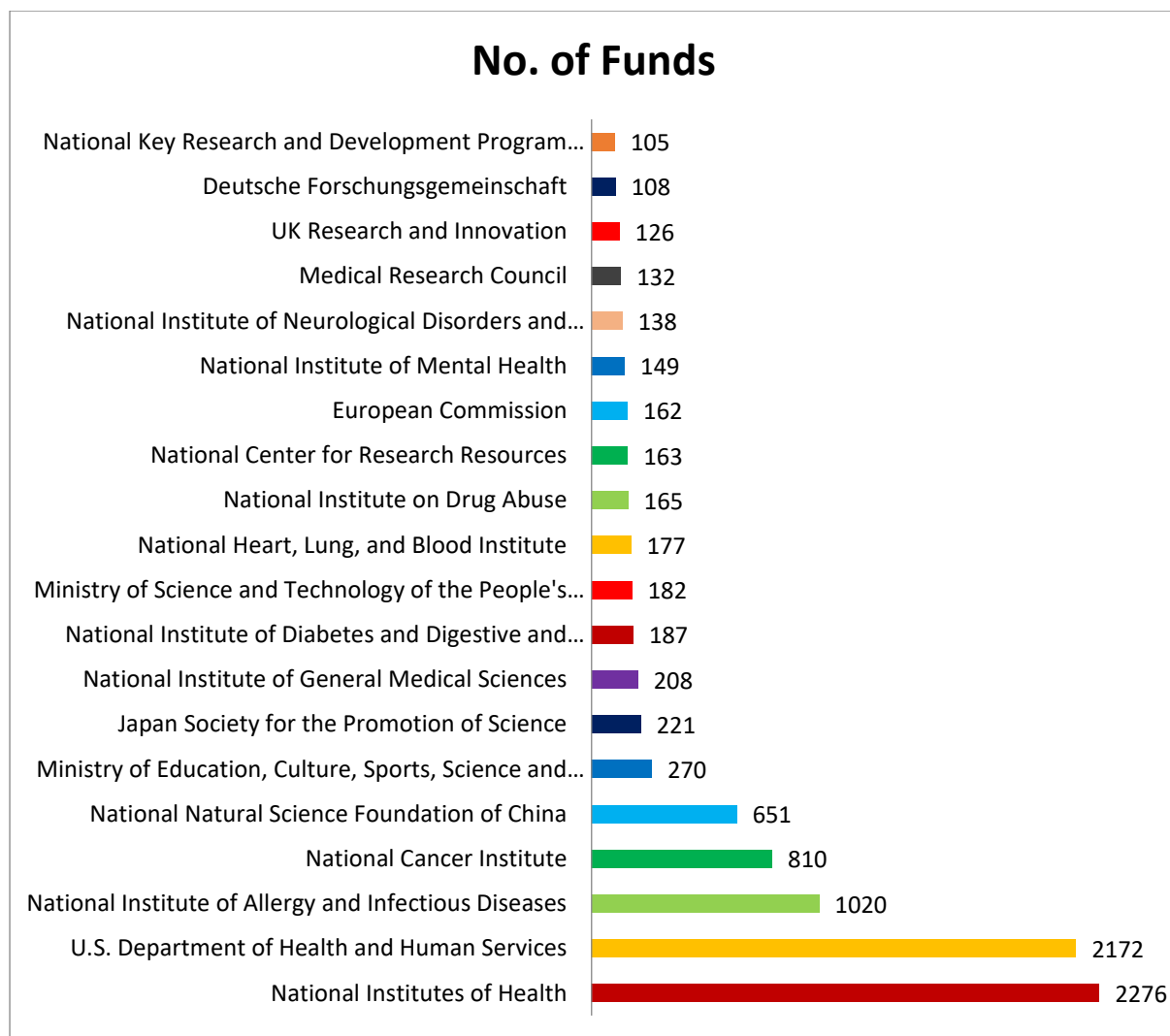


Figure 6: Funding Sponsor on Kappa Virus

The initial analysis focused on cross-country cooperation. Given the scientific output of each nation featured in the performance study, the findings are not entirely unexpected. However, further remarks may be made about the top ten nations' multiple-country collaboration ratio, which is the ratio between the number of multi-country partnerships and the total number of articles ascribed based on the corresponding author's affiliation (Table 4). The United States boasts the most cross-country partnerships (633 multi-country collaborations), yet its multicounty publication (MCP) rate is just 0.20 per cent, considerably lower than China, Japan, and Germany.

When three sources, papers, or authors are cited in a citing document's reference list, they form a co-citation relationship a small designed co-citation study to find out the structure of any discipline. Journal of source co-citation analysis is a potential method to analyze the overall structural horizon of any subject and its related sources. The software analyzes the cited sources used in kappa virus research. A total of 50 nodes were identified, which formed 2 clusters, one red and blue.

The worldwide kappa virus research sponsor with the most funds is the National Institute of Health with 2276, which is followed by the US Department of Health and Human Service with 2172 and National Institute of Allergy and Infectious Disease with 1020 respectively. National Cancer Institute funded 810, the National Natural Science Foundation of China with 651, the Ministry of Education, Culture, Sports, Science and Technology with 270 and the Japan Society for the Promotion of Science with 221 publications.

## Conclusion

The results of this study indicate the status of the map and the increasing trend of the number of Kappa virus research at the international level. The most productive countries, research institutions, and individual researchers in kappa virus research are the United States with 4197 articles, the National Institutes of Health with 273 articles, and Mori, N. with 56 articles. The largest funding sponsor for supporting digital literacy research is the National Science Foundation, with 2276 documents. The most intensive subject area in Kappa virus research in Medicine with 5510 articles (51.86%). The largest source of publications in Kappa virus research is the "Journal of Virology", with 551 articles. The highest international publication in kappa virus research was achieved in 2020 with 673 documents. Future studies may be conducted to evaluate the contribution and effect of digital literacy research by quantifying quotations based on the integration of scientific data from Scopus, PubMed, Web of Science, and others.

## References

1. Ashokumar, P., & Sivasekaran, K. (2017) A Scientometric study on Neutrino research: continental research analysis. *International Journal of Information Management*, 3(4): 31-38.
2. Chithiraivel, S., Jeyshankar, R., & Sivasekaran, K. (2020). Authorship Patterns in Eosinophilia Research Literature: A Scientometric Analysis. *Library Philosophy and Practice*. 2020: <https://digitalcommons.unl.edu/libphilprac/4162>.
3. Chithiraivel, S., Sivasekaran, K., & Jeyshankar Ramalinagam. (2020). Global Research output on Eosinophilia Literature: A Scientometric Analysis. *Library Philosophy and Practice*. <https://digitalcommons.unl.edu/libphilprac/4040>.
4. Ramasamy, R.U., Sivasekaran, K., & Navasakathi, C. (2013). Scientometric Analysis of Thorium Research in India: A Case study, *Global journal for Research Analysis*. 2 (4): 80-8.
5. Sivankalai, S., Sivasekaran, K., Virumandi, A., & Sharmila, M. (2021). Measuring the Honey Bee Research Output: Scientometrics Analysis from 2004 to 2019. *International Journal of Modern Agriculture*, 10(2): 2199-2209
6. Sivankalai, S., & Sivasekaran, K. (2021) Mucormycosis (Black Fungus) Maiming Covid Patients: Scientometrics analysis through prism of Biblioshiny, *Library Philosophy and Practice*. <https://digitalcommons.unl.edu/libphilprac/5546/>.
7. Sivankalai, S., Virumandi, A., Balamurugan, B., & Sharmila, M. (2021). Scientometric Analysis of the Research on the Abortion: 2015-2019. *Turkish Journal of Computer and Mathematics Education*, 12 (4): 115-124.

8. Sivankalai, S., &NazeerBadhusha. K. (2020). Bibliometric study on COVID 19 Outbreak. *International Journal of Library and Information Studies*, 10(2), 1-9.
9. Sivankalai, S.,Virumandi, A., Sivasekaran, K., BalaSankar, B., Balamurugan, B., Sharmila, M., &Kaladevi, P. (2021). Scientometric Analysis and Visualization of Astrovirus based on R-packages. *Library Philosophy and Practice*.<https://digitalcommons.unl.edu/libphilprac/5361>.
10. Sivasekaran, K., Stanleay,P., Ashok Kumar,P., Sivankalai, S.,&Sivasamy, K. (2021). Curcuma Longa(Medicinal Plant) Research: A Scientometric Assessment of Global Publications Output with Reference to Web of Science.*Turkish Journal of Computer and Mathematics Education*,12 (5): 1477-1496.
11. Sivasekaran, K., Sivankalai, S., &Stanleay,P. (2021). Bats are the only flying Mammal: A ScientometricAnalysis.*Library Philosophy and Practice*.<https://digitalcommons.unl.edu/libphilprac/5627>, 1-21.
12. Sivasekaran, K.,StanleayPrabakar,&Ashok Kumar, P.(2020). Mapping the Study and Awareness on Early Death Research: A scientometric Analysis.*Library Philosophy and Practice*.<https://digitalcommons.unl.edu/libphilprac/4368>.
13. Sivasekaran, K.,Prabakar,S.,Chithiraivel, S., Ashok Kumar, P.,&Thirumagal,A. (2019). Electric Car: A Research impact by means of scientometric analysis. *Library Philosophy and Practice*.<https://digitalcommons.unl.edu/libphilprac/3660>.
14. Surulinathi, M.,Rajkumar, N., Jayasuriya, T.,&Rajagopal, T.(2021)Indian Contribution in Animal Behaviour Research: A Scientometric Study. *Library Philosophy and Practice*.): 1-18.
15. Surulinathi, M., Balasubramani, R.,&Amsaveni, N.(2020). COVID-19 research output in 2020: The Global Perspective using Scientometric Study. *Library Philosophy and Practice*.
16. P, Ashok Kumar Kumar Dr.; R, Manoranjitham Dr.; and K, Sivasekaran Dr., "Mapping of Microbial Technology Research Output at the Global Level: A Scientometric Study" (2020). *Library Philosophy and Practice*.<https://digitalcommons.unl.edu/libphilprac/4550/>
17. Trivedi, G. (2019). Visualization and scientometric mapping of global agriculture big data research. *Library Philosophy and Practice*. 1-14.
18. Vijayakumar, M., Sivankalai, S., Michael Joseph Stalin P., Kumaresan, G., Selvakumar, P.,&Manikandan, V.(2021). A scientometric Analysis on Development of Nanofluids for Heat Transfer and Fluid Flow Applications. *Solid State Technology*. 64(2): 3667-3684.
19. <https://www.gisaid.org/hcov19-variants/>
20. <https://www.ndtv.com/india-news/two-cases-of-kappa-covid-variant-detected-in-uttar-pradesh-2482881>