

Bibliometric analysis of Japanese encephalitis research over the past 15 years

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Abstract

Japanese encephalitis (JE) is an acute mosquito-borne infectious disease caused by Japanese encephalitis virus. JE is primarily endemic in Asia, with high mortality and disability rates. In this study, we used bibliometric methods to analyze global research on JE from 2010 to 2024, identifying development trends and hotspots. The results indicated that between 2010 and 2019, annual publications remained stable at 110–130 articles per year; however, a notable increase occurred from 2020, likely related to global public health events. Since 2017, average annual citations have declined, suggesting topic saturation or a shifting research focus. Publications were mainly concentrated in 10 journals, notably *Vaccine*, and keyword analysis showed that “Japanese encephalitis virus” and “vaccine” were the core themes. Coupling cluster analysis identified three major research areas—virology, epidemiology, and vaccine development—with the latter playing a key role in disease control. International collaboration analysis revealed that China, India, and the United States were the main contributors, with the most frequent cooperation between China and the United States. This study systematically delineated the development of research on JE and revealed the evolutionary trend in research hotspots. Our findings provide a scientific basis for the optimization of future research directions and the rational allocation of research resources. Our findings will help to promote further research on the prevention, control, and treatment of JE.

Keywords: Japanese encephalitis, Japanese encephalitis virus, bibliometrics, international collaboration, vaccine

Introduction

Japanese encephalitis (JE) is an acute infection of the central nervous system caused by the Japanese encephalitis virus (JEV), which is prevalent mainly in Asia and poses a serious threat to public health. Since 2010, global climate change, population

mobility, and adjusted vaccination strategies have significantly altered the epidemiological characteristics, preventive measures, and fundamental research directions of JE. In this study, we used bibliometric methods to systematically analyze JE-related publications from 2010 to 2024, focusing on research content, authorship, institutional distribution, and

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international collaboration. As shown in Figure 1, the goal of this study was to reveal developmental patterns, key contributors, and research hotspots in JE, thereby offering guidance for future research priorities and the efficient allocation of research resources. Additionally, we sought to provide a scientific basis for global JE prevention strategies by analyzing prevailing research trends.

Methods

We used the R package “bibliometrix” v. 4.3.0 (<https://www.bibliometrix.org>) to conduct bibliometric analyses. We constructed global distribution networks for JE-related literature and performed data mining and analysis for journals, authors, citations, keywords, institutions, countries, and co-occurrence networks. Metadata in “PubMed export file” format was downloaded from PubMed. Data analysis was executed using R v. 4.3.2 (The R Project for Statistical Computing, Vienna, Austria) with bibliometrix. The initial interpretation of the data was performed using the “biblio-Analysis()” command and “summary()” function in the bibliometrix package. This included the following information: temporal distribution of articles, number and type of documents, average year of publication, average number of citations per document, number of authors, number of single and multiple co-authored documents, number of co-authored documents, authors per document, most prolific authors, highest cited manuscript, country of corresponding author, number

of single-country publications (SCP) and multiple country publications (MCP), total number of citations per country, most relevant sources, and most relevant keywords. A map of the main features was created. We examined collaborative networks with the commands “metaTagExtraction” and “BiblionetWORK” and then graphically depicted these using “Networkplot.” The “Biblioshiny()” command was also used to perform the following analyses: national scientific collaborations, institutional collaborative networks, keyword analysis, co-occurrence network synthesis, and thematic map analysis.

Results

Annual output, citation trends, and journal distribution

According to Figure 2A, JE-related publications remained stable at 110–130 annually from 2010–2019, with an annual average of between 110 and 130 publications, with minor fluctuations but a stable overall trend. The average annual number of citations was also relatively stable during this period. However, the number of published articles increased significantly from 2020, possibly influenced by global public health events. Notably, the average annual citations of publications on JE have declined each year since 2017, which may be related to research topic saturation or shifts in emerging research areas. Publications were concentrated in 10 journals, with Vaccine publishing the highest number of relevant

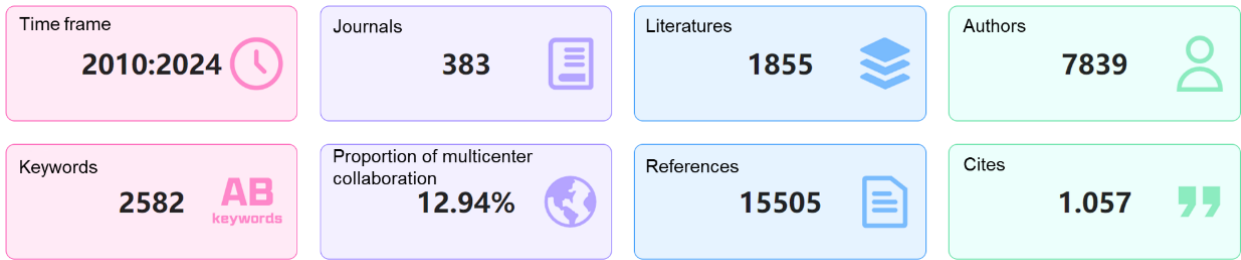


Figure 1. Overview of the bibliometric study.

articles (Figure 2).

Number of national publications

Using a line chart, we illustrated the cumulative annual publication output related to JE in the five leading countries from 2010 to 2024. Beginning in 2014, the number of publications from all institutions showed a significant increase. China consistently ranked first in publication volume, with a total of 1,678 articles published by 2024, followed by India with 869 articles (Figure 3A). The global citation ranking among countries was consistent with the output ranking among countries. China was still ranked first in the global citation ranking, with a cumulative total of 4,554 citations, and India was ranked second with 2,124 citations (Figure 3B).

From 2010 to 2024, the geographic distribution of publications related to JE showed that China was the most productive country/region in this research field (Figure 3C).

Corresponding authors of JE-related publications during the study period were affiliated with institutions from 19 countries. Further comparative analysis of authors and affiliations revealed that 20.12% of publications involved international collaborations (Figure 3D). The countries of corresponding authors were ranked

according to the number of publications. China ranked first (total number of publications: 486; SCP: 437; MCP: 49), followed by India (total number of publications: 273; SCP: 20; MCP: 253), and the United States (total number of publications: 82; SCP: 60; MCP: 22). Among 19 countries, India had the highest SCP proportion (92.7%); China and the United States had SCP proportions of 89.9% and 73.1%, respectively.

Author contributions, productivity, and citations

As shown in Figure 4A, the 10 most productive authors contributed a total of 378 publications. Shengbo Cao from Huazhong Agricultural University published the most papers ($n = 49$), followed by Anirban Basu from the University of Washington ($n = 48$) and Huanchun Chen, also from Huazhong Agricultural University ($n = 41$). Figure 4B provides a more detailed visualization of the publication timeline of these authors. Darker-colored nodes represent a higher number of publications. It is evident that the three most prolific authors have been active in this field for the longest time. Jianchao Wei, Yafeng Qiu, Zhiyong Ma, Ke Liu, and Beibei Li also had a substantial number of academic publications in 2020. Author productivity was assessed using Lotka’s Law, as illustrated in Figure 4C. As shown in both the figure and in Table 1, in terms of scientific productivity (i.e., number of papers authored), the number

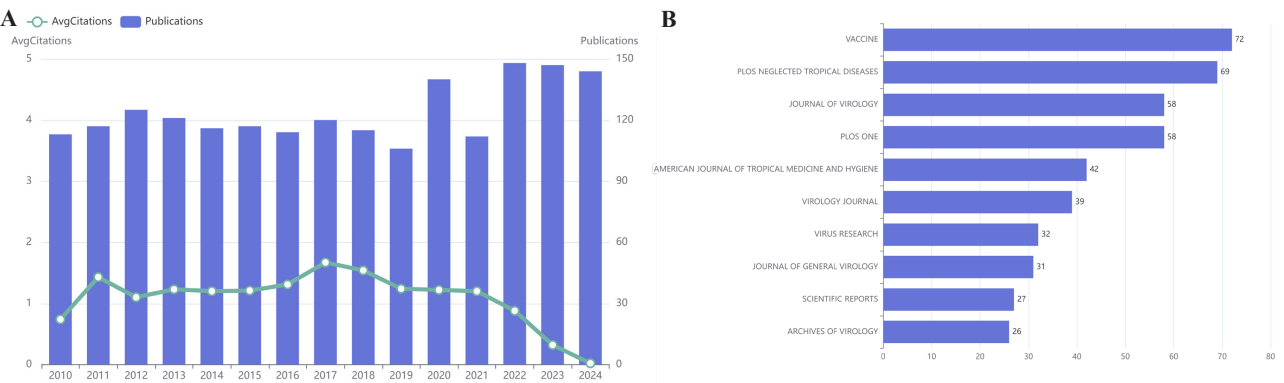


Figure 2. Characteristics of articles on Japanese encephalitis from 2010 to 2024.
(A) Annual number of articles and average annual number of citations. (B) Journal distribution.

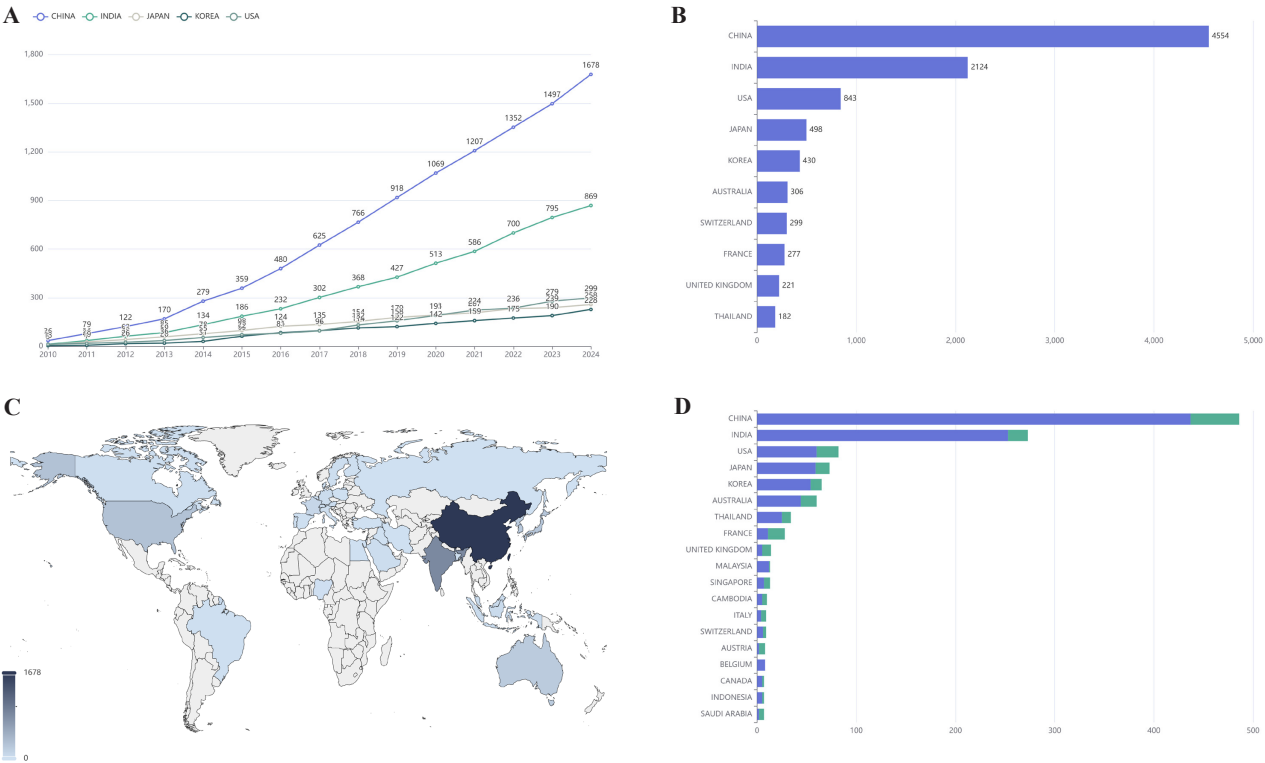


Figure 3. Analysis of publications on Japanese encephalitis, by country.

(A) Output maps and citation rankings of different countries related to Japanese encephalitis from 2010 to 2024. (B) Citation ranking of different countries related to Japanese encephalitis from 2010 to 2024. (C) Regional distribution of scientific output of different countries related to Japanese encephalitis from 2010 to 2024. (D) Ranking of publications by country of the corresponding author and proportion of international collaborations in publications related to Japanese encephalitis from 2010 to 2024.

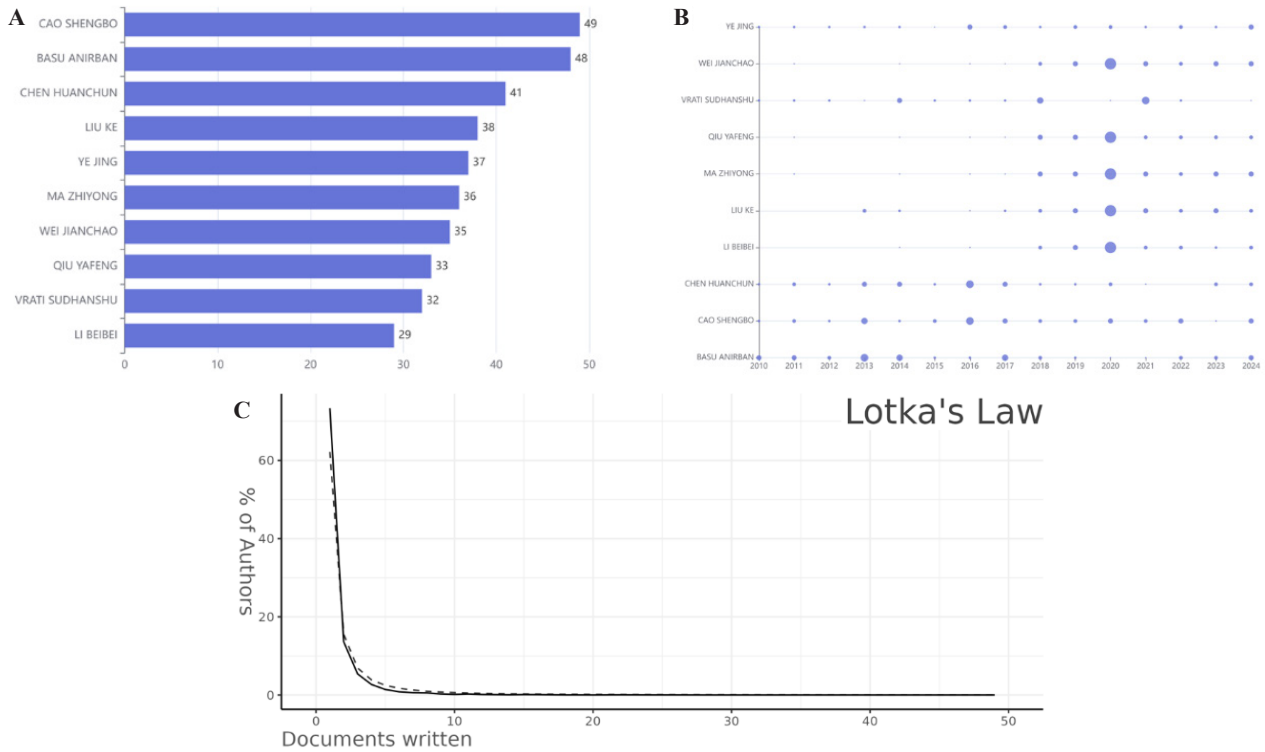


Figure 4. Analysis of authorship for publications on Japanese encephalitis.

(A) Ten leading authors with the most publications. (B) Trends in publication by author between 2010 and 2024. (C) Distribution of author productivity.

of authors declines as the number of publications per author increases. The most cited literature related to JE worldwide between 2010 and 2024 was Campbell (2011) ^[1] with a total of 401 citations, followed by Kalita (2010) ^[2] with 125 citations and Li (2015) ^[3] with 114 citations (Figure 5).

Keywords analysis

An analysis of publication keywords was conducted

to assess different topics related to JE research. The 50 most frequently used keywords were visualized in a word cloud and a hierarchical tree map (Figure 6A and 6B). The most common keywords were “Japanese encephalitis virus” (407 occurrences), “Japanese encephalitis” (241 occurrences), and “flavivirus” (82 occurrences) (Figure 6C). Looking at the change in word frequency in the literature related to JE with respect to year, JEV has been the main subject of research since 2012 (Figure 7A).

Table 1. Lotka’s law describes the distribution of author productivity in scientific production activities.			
Number of Articles	Number of Authors	Frequency	Theoretical rate
1	5750	0.7335	0.6217
2	1066	0.136	0.1554
3	424	0.0541	0.0691
4	212	0.027	0.0389
5	111	0.0142	0.0249
6	65	0.0083	0.0173
7	46	0.0059	0.0127
8	42	0.0054	0.0097
9	22	0.0028	0.0077
10	13	0.0017	0.0062
11	21	0.0027	0.0051
12	11	0.0014	0.0043
13	8	0.001	0.0037
14	5	0.0006	0.0032
15	9	0.0011	0.0028
16	8	0.001	0.0024
18	2	0.0003	0.0019
19	2	0.0003	0.0017
20	1	0.0001	0.0016
22	4	0.0005	0.0013
24	2	0.0003	0.0011
25	2	0.0003	0.001
26	2	0.0003	0.0009
28	1	0.0001	0.0008
29	1	0.0001	0.0007
32	1	0.0001	0.0006
33	1	0.0001	0.0006
35	1	0.0001	0.0005
36	1	0.0001	0.0005
37	1	0.0001	0.0005
38	1	0.0001	0.0004
41	1	0.0001	0.0004
48	1	0.0001	0.0003
49	1	0.0001	0.0003

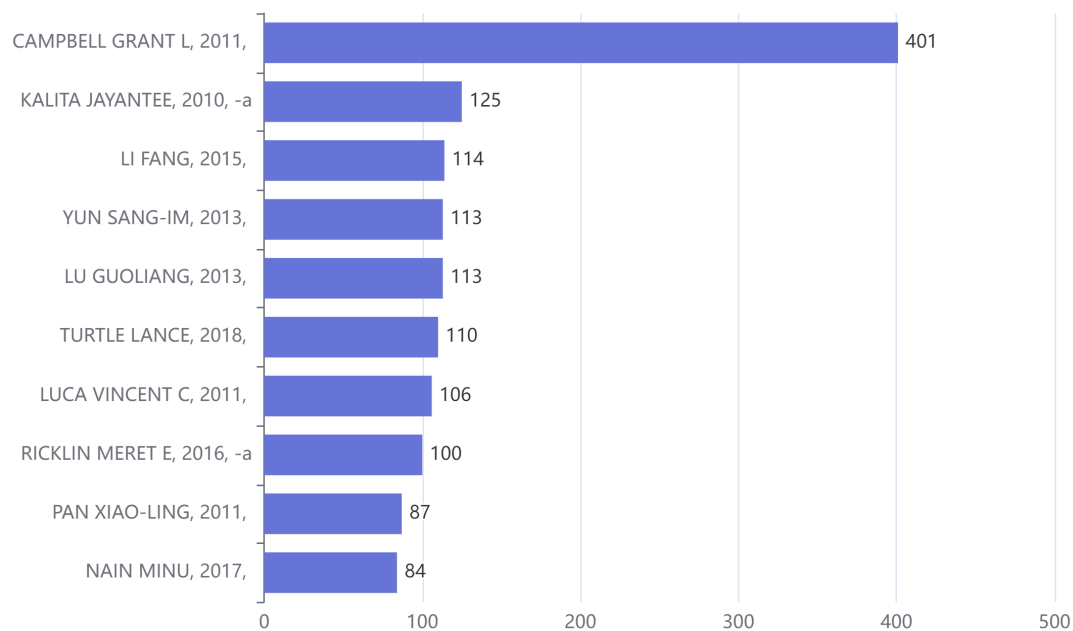
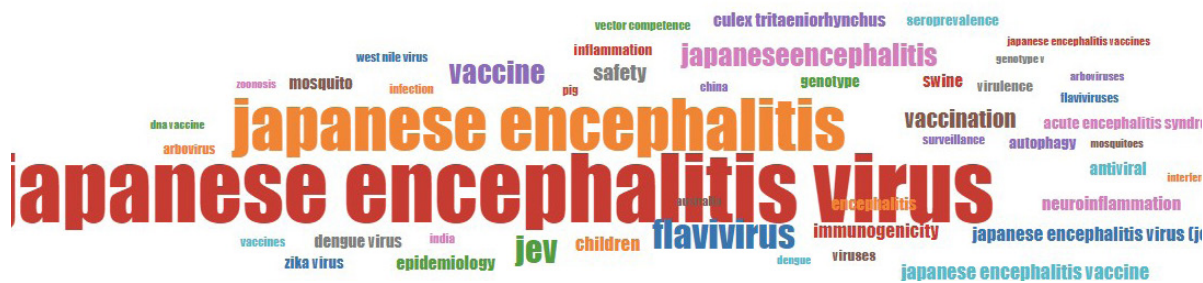
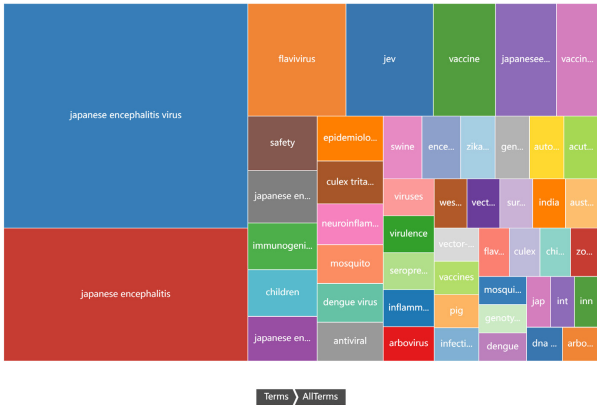


Figure 5. Citation ranking for publications related to Japanese encephalitis (2010–2024).

A



B



C

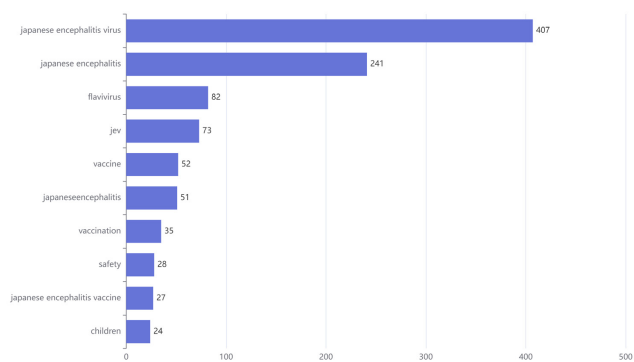


Figure 6. Fifty leading keywords in terms of occurrence frequency in publications related to Japanese encephalitis from 2010 to 2024.

WordCloud, Tree Map, and bar charts show the most frequently occurring keywords.

By mining the literature data from this period, we aimed to uncover the main research themes and their evolutionary trajectories in the JE field (Figure 7B).

The analysis revealed several key research topics that have shown significant development trends over the past 14 years. Research on JEV began to increase in

2017, with a median publication year of 2020, and maintained a high frequency of studies through 2023. This indicates that JEV has remained a consistently prominent focus in the field. Research on JE saw a rapid increase beginning in 2017, with a median publication year of 2019, and remained active through 2021. Studies on flavivirus began to rise significantly in 2018, with a median publication year of 2020, and continued through 2022. This reflects the sustained scientific interest in JE and a concentration of research activity around 2020, likely associated with heightened interest in vaccine development. Research on vaccines began increasing in 2017, with a medi-

an publication year of 2020, and continued through 2021.

Coupling clustering analysis

In coupling cluster analysis of global scientific articles on JE between 2010 and 2024, we identified five main clustering groups, each demonstrating different research focuses and characteristics (Figure 8A and 8B). Following is a detailed description of each cluster (Figure 8B): Cluster 1 included 63 articles. This cluster was mainly denoted “jev - conf 81.8%,” indicating its dominant position in the cluster. “Japanese encephalitis

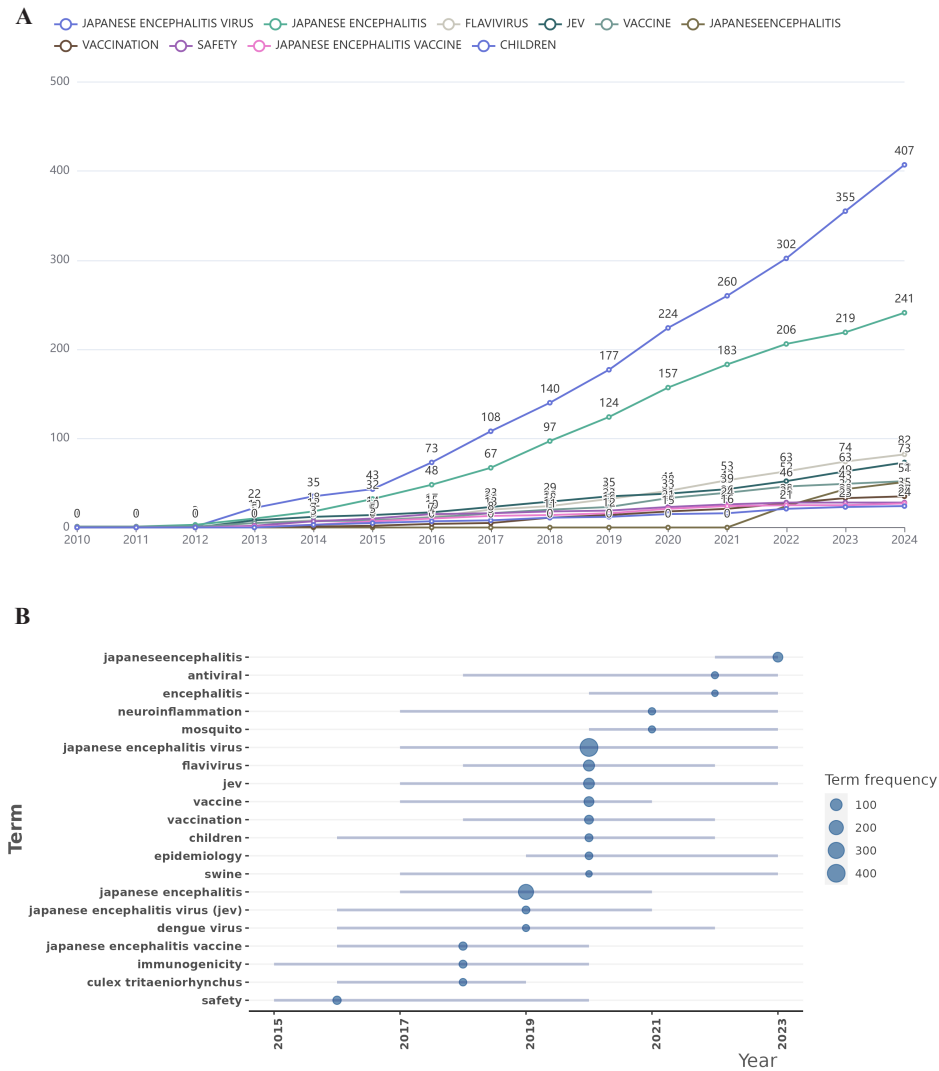
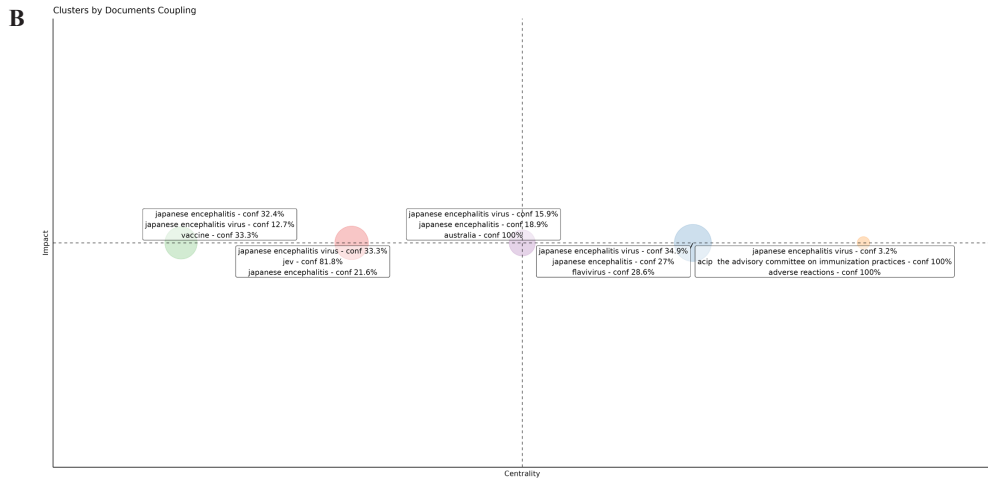


Figure 7. Changes in keywords appearing in publications on Japanese encephalitis.

(A) Frequency of keywords in publications related to Japanese encephalitis from 2010 to 2024. (B) Trends in research topics related to Japanese encephalitis from 2010 to 2024.



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virus - conf 33.3%" and "Japanese encephalitis - conf 21.6%" were also important components of this cluster, with centrality 0.3804 and impact 1.000, indicating that the literature in this cluster has high academic impact. Cluster 2 was the largest cluster, containing 83 articles. This cluster featured tags such as "Japanese encephalitis virus - conf 34.9%," "Japanese encephalitis - conf 27%," and "flavivirus - conf 28.6%," indicating a balanced distribution among these three topics. Centrality in Cluster 2 was 0.4486, slightly lower than Cluster 1 but still showing strong network centrality. Impact was 1.000, the same as Cluster 1, showing that the literature in this cluster also has a high degree of academic influence. Cluster 3 comprised 57 articles. This cluster was characterized by the high-frequency tags "Japanese encephalitis - conf 32.4%," "Japanese encephalitis virus

- conf 12.7%,” and “vaccine - conf 33.3%,” showing the importance of these topics in this cluster. Centrality was 0.3275, which although relatively low, still reveals its importance in the network considering the size of the cluster. Impact was 1.000, reflecting a high degree of influence for the literature in this cluster. Cluster 4 contained 35 articles. This cluster was characterized by the high-frequency tags “Japanese encephalitis virus - conf 15.9%,” “Japanese encephalitis - conf 18.9%,” and “australia - conf 100%,” showing the importance of these topics in the cluster. Centrality was 0.4128, indicating that the cluster occupies a relatively central position in the entire network. Impact was 1.000. Cluster 5 included 12 articles. This cluster was characterized by the high-frequency tags “Japanese encephalitis virus - conf 3.2%,” “acip the advisory committee on

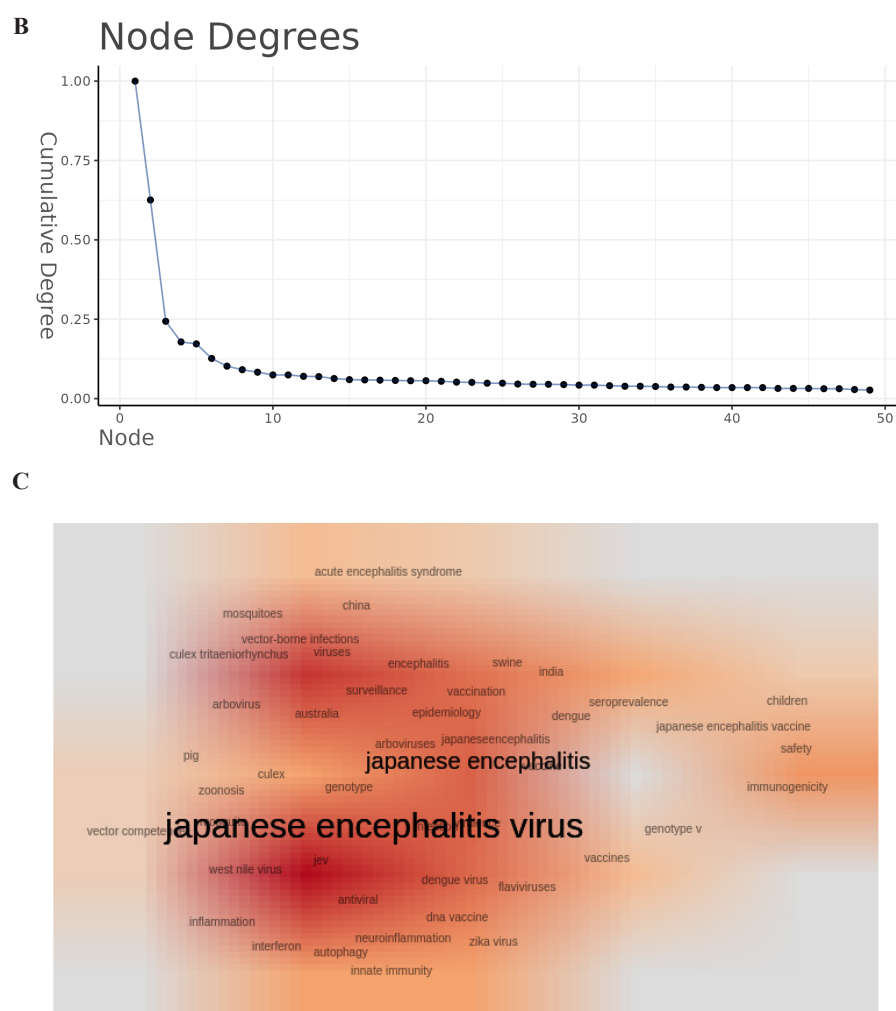


Figure 9. Keyword co-occurrence network (A), density map (B), and degree distribution map (C) for publications related to Japanese encephalitis between 2010 and 2024.

on JE published from 2010 to 2024, based on research topic keywords (Figure 10A). The thematic map, constructed using Callon's centrality and density metrics, categorizes research themes into seven clusters (Figure 10B): Cluster 1, "Japanese encephalitis virus" (centrality: 0.2088, density: 7.8302) ranked 7th in centrality. This theme occupied a central position in the research network, showing strong connections with other topics as well as high internal coherence and consistency. Its top centrality score indicates that JEV remains the core research theme in the field. Cluster 2, "Japanese encephalitis" (centrality: 0.1453, density: 7.0873), ranked 6th in centrality. Similar to Cluster 1, this theme also plays a central role in the research network. Although its density was slightly lower than that of

JEV, it still demonstrated strong thematic consistency. Cluster 3, “safety” (centrality: 0.0427, density: 7.0938) ranked 2nd in centrality. This theme showed relatively low centrality, suggesting it is more peripheral within the research network. It also had a significantly lower clustering frequency compared with the previous two clusters, reflecting its limited interest within the broader research domain. The evolution of research themes related to JE from 2010 to 2024 showed notable shifts over time, particularly a surge in publications after 2018 owing to growing concerns surrounding the disease (Figure 10C). During 2023–2024, research began to address JE in specific populations (e.g., children) and severe encephalitis B (Figure 10C). These changes reflect the dynamics in the field of JE research over

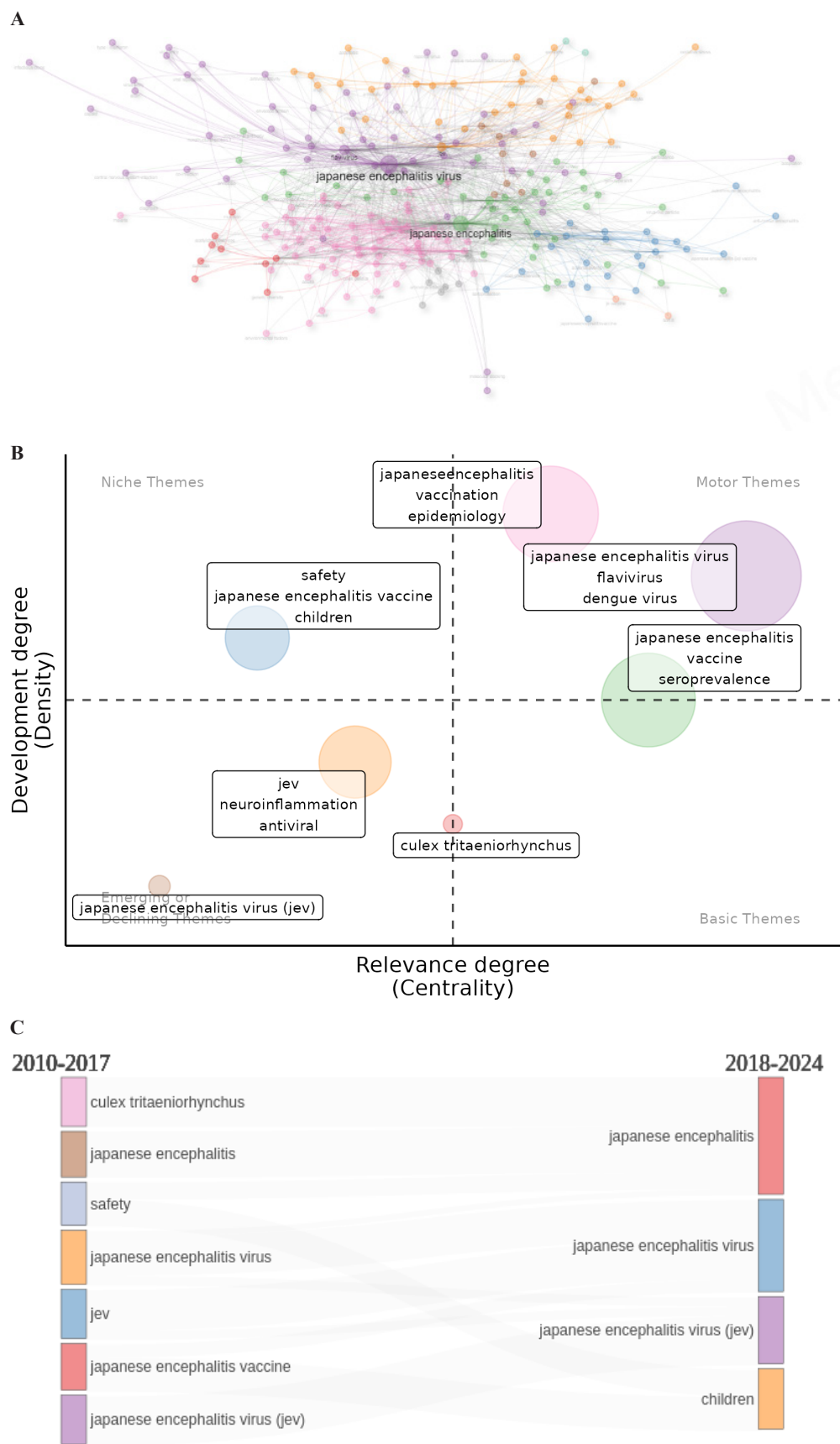


Figure 10. Thematic properties related to “Japanese encephalitis.”

(A) Thematic maps. (B) Map of the spatial distribution of the different themes or research directions in the literature datasets. (C) Evolution of research themes over time.

time and changes in external factors.

We conducted factor analysis of variables related to JE globally from 2010 to 2024. Factor analysis is used to study the intrinsic relationship between variables and to search for an underlying structure in the data by reducing the number of variables. The results of factor analysis showed that research related to JE covers many aspects, from vaccine research and development to basic virology research. There were some interrelationships and intersections among different research directions, but these also had their own unique focus and research hotspots (Figure 11).

Co-citation network

We conducted co-citation network analysis for the global JE literature published from 2010 to 2024 (Figure 12A). The network map highlights the pivotal role of core publications, particularly Campbell (2011), within the academic network. As the most influential reference, Campbell (2011) exhibited high betweenness centrality and PageRank values, underscoring its central position within the research community. In addition to Campbell's work, other influential publications such as Solomon (2003) and Pan (2011) demonstrated important roles in the study of JEV transmission (Figure 12B and 12C). These results not only revealed the key contributors in the field but also reflected the structural relationships and influence distribution among various research themes in JE investigations.

Collaboration network analysis

From 2010 to 2024, a total of 7,839 authors contributed to the global body of literature related to JE. We constructed a collaboration network on the basis of authors who had published at least two relevant papers (Figure 13A). Influential contributors such as Zhiyong Ma,

Shengbo Cao, and Huanchun Chen demonstrated high levels of participation and impact within the co-authorship network (Figure 13B and 13C). Collaboration network analysis revealed extensive international cooperation, particularly between China and countries such as the United States, Australia, and Thailand, with Sino-American collaboration occurring 32 times (Figure 13D). European countries, including France and Germany, also exhibited strong intra-regional cooperation, highlighting the breadth and diversity of global scientific collaboration in this field.

Through the above analyses, this study identified major trends, key contributors, and research hotspots in the JE field, providing a scientific foundation for prioritizing future research directions and optimizing the allocation of research resources.

Discussion

Over the past decade, the field of JE research has undergone considerable development and transformation, with evolving trends and emerging topics deserving in-depth exploration. In terms of the number of publications and citation trends, the number of articles related to JE remained relatively stable between 2010 and 2019, but showed substantial growth from 2020, which may be related to the impetus of global public health events. However, the annual average citation count declined from 2017, suggesting either saturation of traditional research themes or a rise in new research domains. Highly cited literature and keyword analysis revealed that themes such as “Japanese encephalitis virus” and “vaccine” continue to draw scholarly attention, suggesting that vaccine development and immune response assessment are core topics in this field.

No effective treatment for JE currently exists, and therefore innovative strategies such as genetic immu-

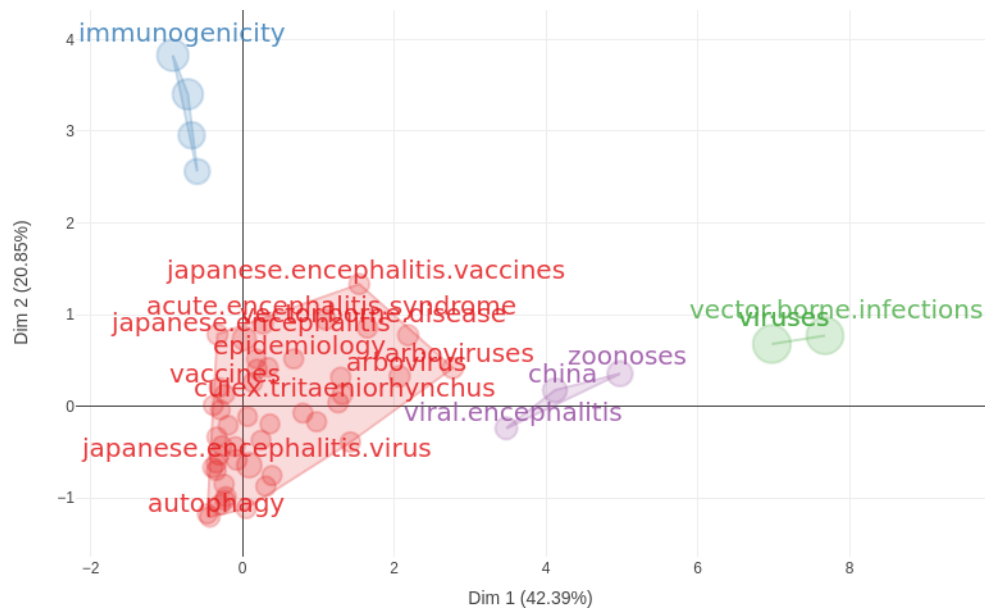
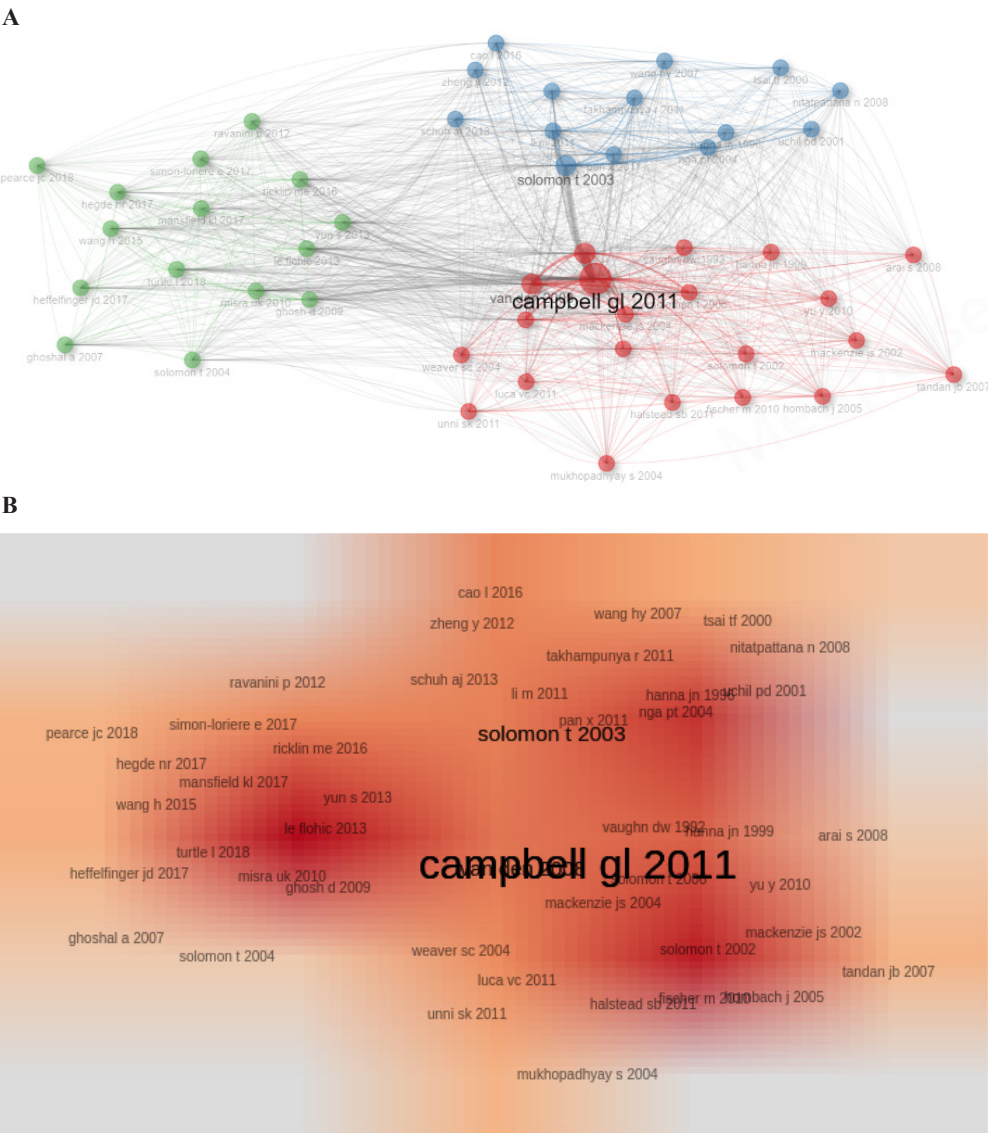


Figure 11. Factor analysis of research areas related to Japanese encephalitis.



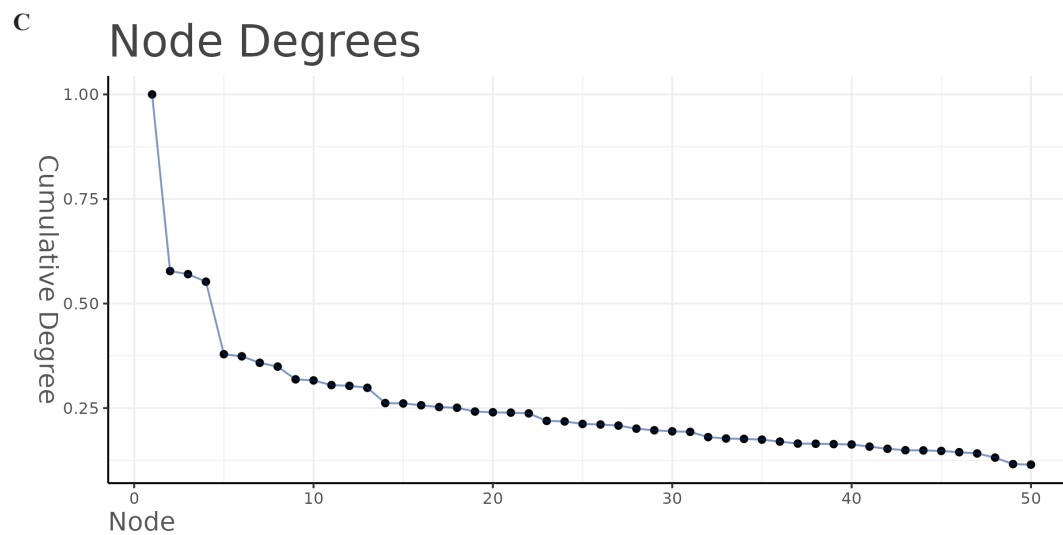
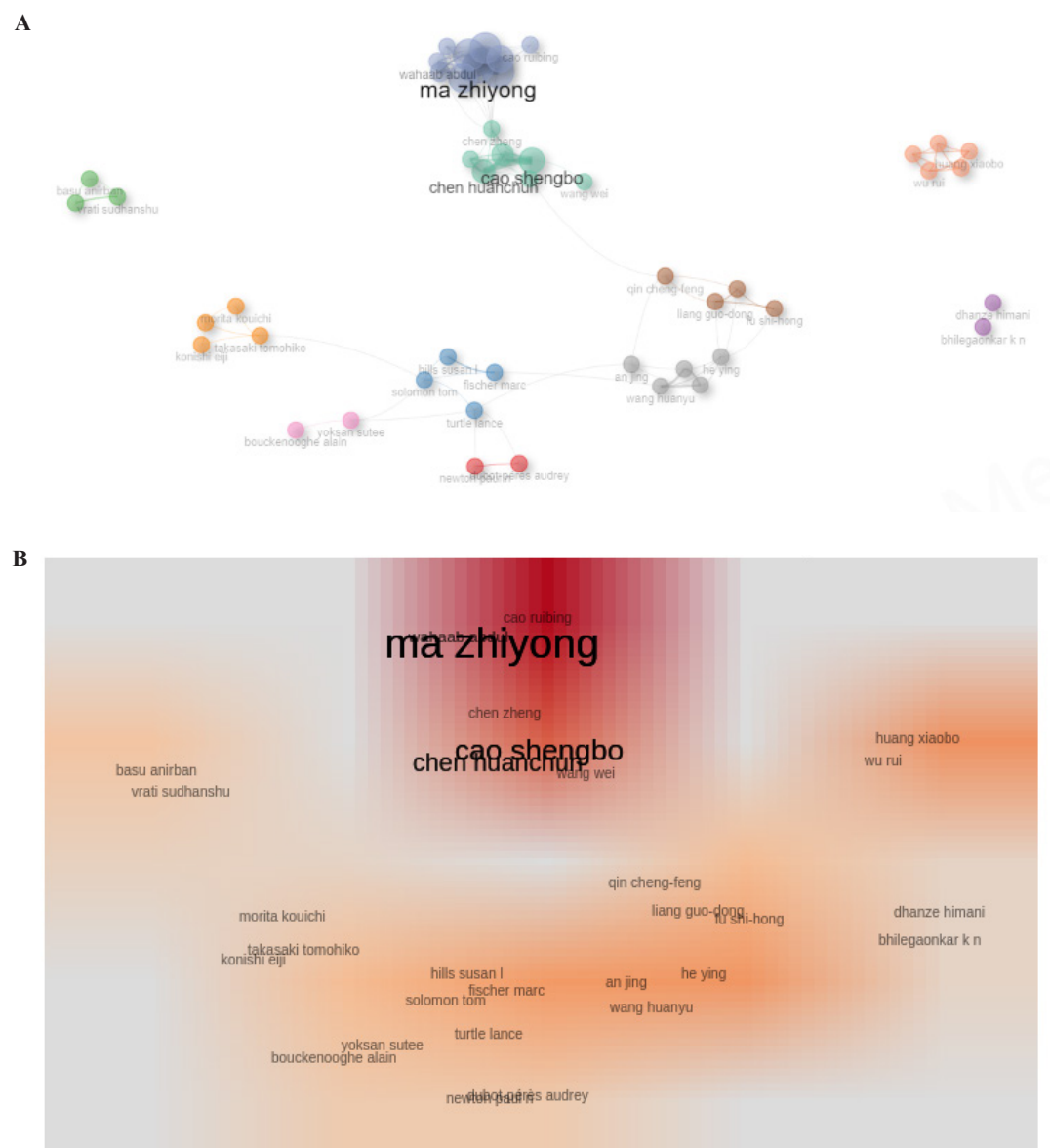


Figure 12. Keyword co-citation network (A), density map (B), and degree plot (C) for publications related to Japanese encephalitis from 2010 to 2024.



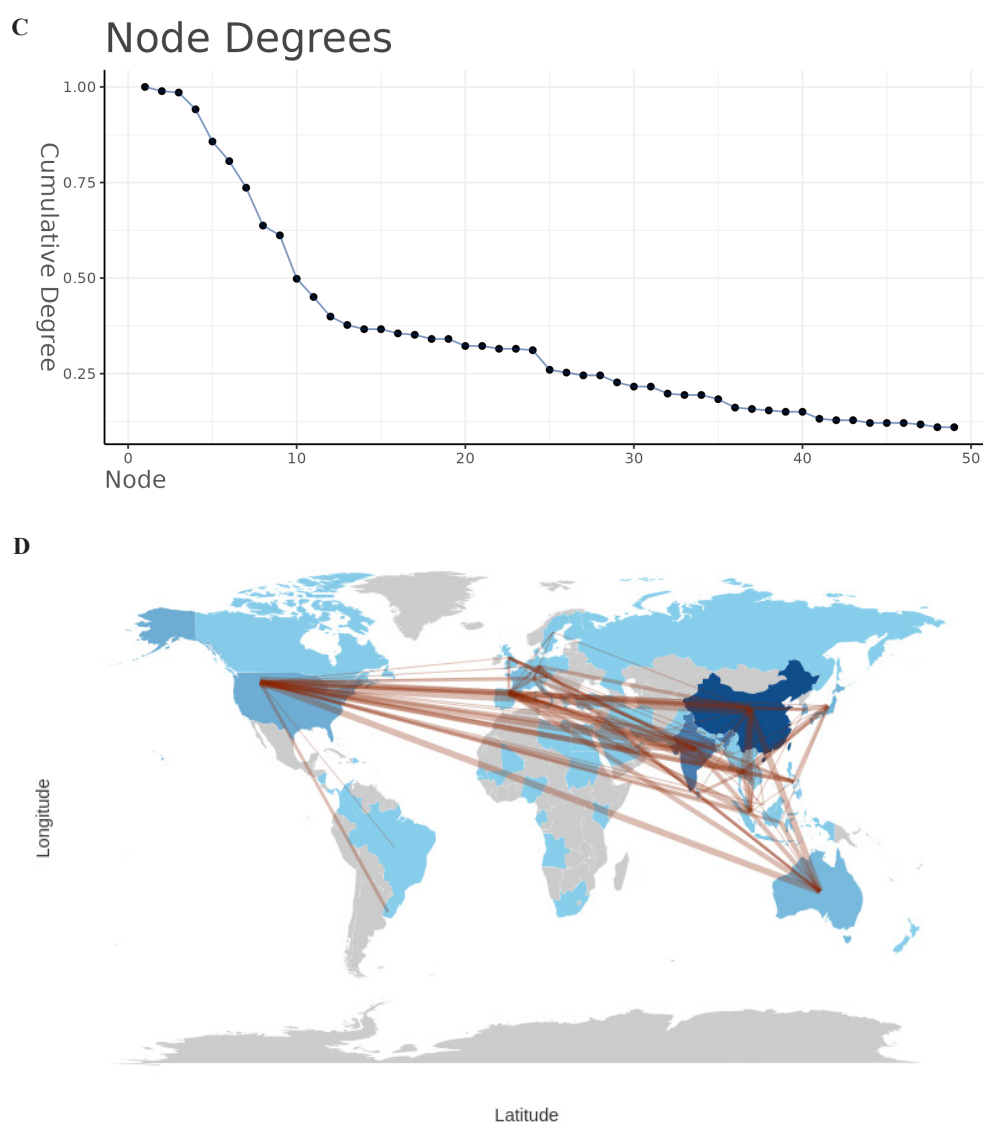


Figure 13. Networks of cooperation with respect to publications on Japanese encephalitis from 2010 to 2024.

Network map (A), density map (B), and degree plot (C). (D) World map of collaboration between countries in Japanese encephalitis research.

nization and mRNA technology offer new hope in JE prevention and control. Studies have shown that plasmid DNA encoding JEV NS1 or PrM/E proteins can effectively induce protective immunity in mice, enabling the long-term persistence of virus-specific memory B cells *in vivo* [4]. DNA vaccines expressing NS1 have been co-administered with heat shock protein 70 plasmids to enhance cellular immunity, highlighting the essential role of cell-mediated responses [5]. In the field of mRNA vaccines, a modified mRNA encoding the PrM and E proteins of the JEV P3 strain, delivered via lipid nanoparticles, could significantly reduce viral-induced neuroin-

flammation in mice [6]. Other innovative strategies such as the use of colloidal gold particles, gene gun delivery of chitosan-based vaccines, and microencapsulation of encapsulated DNA vaccines, used in combination with protein vaccines (i.e., initial immunization with plasmid DNA followed by a booster with a protein vaccine) may be effective in inducing protective immunity [7].

In terms of international co-operation and national contributions, China has shown outstanding performance in the field of JE research, ranking first globally in terms of both the number of articles published

and number of citations, demonstrating its dominant position in this field. The proportion of internationally co-authored publications reached 20.12%, with China–US collaborations occurring most frequently. This underscores the importance of global scientific cooperation in advancing JE research. Countries such as India, the United States, Australia, and Thailand have also made notable contributions, confirming that JE remains a global health concern requiring concerted international efforts.

In terms of key research themes, “Japanese encephalitis virus” and “Japanese encephalitis” were central nodes in the co-occurrence network, acting as critical bridges between various research areas. Factor analysis and cluster analysis further identified five major clusters, such as “JEV–conf 81.8%” and “Japanese encephalitis virus–conf 34.9%,” reflecting the diversity and complexity of topics in this field. Among them, the study published by Campbell in 2011 has had an important impact within the research community and has become one of the core publications in the field. Additionally, we summarized the 10 most highly scored and 10 most frequently cited articles in this study, which provides an important reference for subsequent research (Tables 2 and 3).

In terms of research methods and technological advances, investigations of JE involve not only traditional epidemiological studies but also modern methods, such as molecular biology and ecology. The study of basic biological mechanisms is also advancing, and the application of genomics, proteomics, and other technologies has provided new perspectives in exploring the characteristics of JEV. In the future, interdisciplinary integration will become an important trend in research, for example, combining epidemiology and molecular biology to explore in depth the molecular mechanism of JEV transmission or combining vaccine development

and immunology to optimize vaccine design and immunization strategies. At the same time, the application of new technologies, such as big data and artificial intelligence, will further enhance the efficiency and accuracy of research, predicting trends in virus transmission via data analysis and providing a scientific basis for the formulation of prevention and control measures.

Although considerable progress has been made in research on JE, the problem of unequal distribution of research resources persists. Some countries and regions have difficulties conducting high-level research owing to economic and technical constraints; thus, support and collaboration from the international community are urgently needed. As an important public health issue, the prevention and control of JE is an important task that requires further strengthening of vaccination coverage, raising public health awareness, and improving disease surveillance as well as early warning systems to effectively reduce the incidence and spread of this disease.

Conclusion

The field of research on JE has achieved remarkable results over the past decade and a half, especially in terms of vaccine development, epidemiological investigations, and identifying basic biological mechanisms. Future research breakthroughs in additional areas are expected to provide strong support for disease prevention and control. Governments and all sectors of society should increase their investment in research on JE, especially in the areas of vaccine research, disease prevention and control, and talent cultivation, by providing adequate funding and resources for scientific research. All countries are encouraged to strengthen scientific research cooperation, share research results and experience, and work together to address the global public health problem of JE.

Table 2. Ten highly cited articles selected based on the number of citations by combining global “Japanese encephalitis” literature data from 2010 to 2024.

Title	Publication date	Journal	Citation count
Estimated global incidence of Japanese encephalitis: a systematic review. ^[1]	2011-11-16	BULLETIN OF THE WORLD HEALTH ORGANIZATION	401
Overview: Japanese encephalitis. ^[2]	2010-2-6	PROGRESS IN NEUROBIOLOGY	125
Viral Infection of the Central Nervous System and Neuroinflammation Precede Blood-Brain Barrier Disruption during Japanese Encephalitis Virus Infection. ^[3]	2015-3-13	JOURNAL OF VIROLOGY	114
Crystal Structure of the full-length Japanese encephalitis virus NS5 reveals a conserved methyltransferase-polymerase interface. ^[8]	2013-8-17	PLOS PATHOGENS	113
Japanese encephalitis: the virus and vaccines. ^[9]	2013-10-29	HUMAN VACCINES & IMMUNOTHERAPEUTICS	113
Japanese encephalitis - the prospects for new treatments. ^[10]	2018-4-27	NATURE REVIEWS NEUROLOGY	110
Crystal structure of the Japanese encephalitis virus envelope protein. ^[11]	2011-12-14	JOURNAL OF VIROLOGY	106
Vector-free transmission and persistence of Japanese encephalitis virus in pigs. ^[12]	2016-2-24	NATURE COMMUNICATIONS	100
Emergence of genotype I of Japanese encephalitis virus as the dominant genotype in Asia. ^[13]	2011-6-24	JOURNAL OF VIROLOGY	87
GRP78 Is an Important Host Factor for Japanese Encephalitis Virus Entry and Replication in Mammalian Cells. ^[14]	2017-1-6	JOURNAL OF VIROLOGY	84

Table 3. Ten leading articles with the highest impact factor, combining data from global “Japanese encephalitis” publications during 2010–2024.

Title	Publication date	Journal	Impact factor	Citation count
Protecting children against Japanese encephalitis in Bali, Indonesia. ^[15]	2018-7-7	LANCET	88.5	9
Japanese Encephalitis in Australia - A Sentinel Case. ^[16]	2022-9-7	NEW ENGLAND JOURNAL OF MEDICINE	78.5	18
Autochthonous Japanese Encephalitis with Yellow Fever Coinfection in Africa. ^[17]	2017-4-14	NEW ENGLAND JOURNAL OF MEDICINE	78.5	62
The molecular determinants governing the immunogenicity of Japanese encephalitis live attenuated vaccines. ^[18]	2017-12-22	SIGNAL TRANSDUCTION AND TARGETED THERAPY	52.7	2
Japanese encephalitis - the prospects for new treatments. ^[10]	2018-4-27	NATURE REVIEWS NEUROLOGY	33.1	110
How many patients with anti-JEV IgM in cerebrospinal fluid really have Japanese encephalitis? ^[19]	2015-11-27	LANCET INFECTIOUS DISEASES	31	12
Immunogenicity and safety of measles-rubella vaccine co-administered with attenuated Japanese encephalitis SA 14-14-2 vaccine in infants aged 8 months in China: a non-inferiority randomised controlled trial. ^[20]	2019-3-6	LANCET INFECTIOUS DISEASES	31	8
Safety and immunogenicity of a purified inactivated Zika virus vaccine candidate in adults primed with a Japanese encephalitis virus or yellow fever virus vaccine in the USA: a phase 1, randomised, double-blind, placebo-controlled clinical trial. ^[21]	2023-6-30	LANCET INFECTIOUS DISEASES	31	3
India intensifies Japanese encephalitis immunisation. ^[22]	2014-9-10	LANCET INFECTIOUS DISEASES	31	0
Will dual Japanese encephalitis and measles-rubella vaccination hinder measles and rubella eradication? ^[23]	2019-3-6	LANCET INFECTIOUS DISEASES	31	0

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Author contributions

Zheng Wu Yingmei Feng wrote the manuscript and YF reviewed the manuscript.

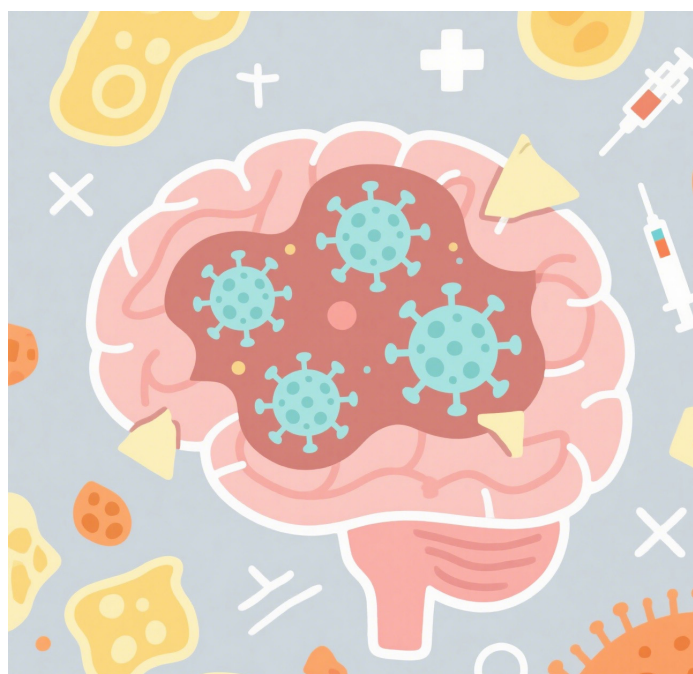
Conflicts of Interest

All authors declare no conflicts of interest.

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Japanese encephalitis (JE), also known as epidemic encephalitis B, is an acute zoonotic infectious disease caused by the Japanese encephalitis virus.