

Global research collaboration and thematic mapping of Diabetic Neuropathy Research: A Scientometric Study Based on PubMed

¹ Samyak Pratik Pattanaik, ² Dr Bikram Kishore Beura

¹Research Scholar, Department of Library and Information Science, Sambalpur University, India

²Assistant Professor, Department of Library and Information Science, Sambalpur University, India

Email – ¹jesssamyak@gmail.com, ²bkbbeura@gmail.com

Abstract: The present study aims to explore the global research landscape of Diabetic Neuropathy (DN) using a scientometric analysis of the literature published in the PubMed database from 2021 to 2025. The retrieval and analysis of the records were performed in the Biblioshiny interface of the Bibliometrix package in R and resulted in a total of 1,347 records. The publications growth, the most influential authors, the most productive journals, the most frequent co-authorship patterns, the institutional connections, and the thematic developments of DN research were among the factors studied. Results showed that the scientific production had been gradually growing at 8.42% per year, suggesting that the world is now devoting more scientific attention to diabetic neuropathy and its complications. Collaborative patterns between authors and institutions were found to be strong, especially between the research networks of the United States and Europe. Thematic mapping showed that the areas of diabetic foot ulcers, wound healing, neuropathic pain, and regenerative therapies were major research focus areas, whereas machine learning and advanced therapeutic interventions were emerging. The research also emphasizes the multi-disciplinary aspects of DN research, which involve endocrinology, neurology, podiatry and wound-care science. Overall, the results offer valuable insights into current research trends, thinking models and emerging priorities in the field of global diabetic neuropathy research.

Keywords: Diabetic Neuropathy, Scientometric Analysis, Research Trends, Bibliometrix, VOSviewer, PubMed.

1. INTRODUCTION

Diabetic Neuropathy (DN) is regarded as one of the most common and disabling chronic complications of diabetes mellitus, which plays a significant role in the morbidity, disability, and reduced quality of life of individuals with diabetes mellitus. DN is characterised by progressive nerve damage due to chronic metabolic dysfunction and is typically associated with peripheral sensory nerve damage, neuropathic pain, autonomic dysfunction, and motor dysfunction (Feldman et al., 2019). Diabetic peripheral neuropathy is one of the most studied clinical complications and is linked with foot ulceration, infections, gait instability and lower-limb amputation. DPN is considered to be a major public health problem, affecting almost 50% of the global diabetic population, according to recent estimates (Savelieff et al., 2025).

Diabetes mellitus is becoming widespread worldwide, increasing the concern about the occurrence of diabetic neuropathy, especially in developing nations where access to health care, early diagnosis, and preventive measures are not adequate. In addition to being a significant economic burden on healthcare systems, DN also places a strain on the psychological well-being of patients, causing sleep issues, productivity loss and long-term disability (Barrett et al., 2007). Newly emerging evidence also indicates that microvascular dysfunction, chronic inflammation, oxidative stress and metabolic disturbance are all factors associated with the pathogenesis of the disease, and all of these have been linked to neuropathic complications in the past, expanding the scope of understanding of disease pathogenesis beyond glycaemic imbalance alone (Savelieff et al., 2025). The last ten years have seen significant progress in the field of diagnosis, identification of biomarkers, the treatment of wounds, regenerative medicine and the use of artificial intelligence in screening to detect diabetic neuropathy. Research at the forefront of the present day emphasizes the multidisciplinary approach to a diabetic foot, combining the management of endocrinology, neurology, podiatry,

rehabilitation sciences, and molecular medicine (Kurz et al., 2026). In parallel, the field of diabetic foot complications and neuropathic pain management have become the predominant areas of clinical and translational research. The use of systematic reviews, multi-centre clinical trials and evidence based therapeutic guidelines is evidence of the increasing maturity and complexity of the research field. In the context of increasing number of scientific publications, scientometric analysis is an appropriate method for measuring the productivity of a scientific publication, structuring scientific knowledge, assessing collaboration and analysis of the evolution of themes in a certain scientific area. Scientometric methods are used for quantifying and mapping influential authors, institutions, countries, journals and emerging research themes. While there are several narrative and systematic reviews about diabetic neuropathy, there are relatively few comprehensive scientometric studies that explore the recent global research landscape (Tavakoli et al., 2023).

In this context, the present research study is an attempt to perform scientometric analysis of global research output on Diabetic Neuropathy in PubMed database from 2021-2025. The study will examine the growth of publications, the top publishers, co-authorship networks, and changing topical trends to offer a clearly organized overview of current research trends and new research priorities in the field of diabetic neuropathy.

2. OBJECTIVES OF THE STUDY

The aim of the present study was to perform a scientometric analysis on global research output on Diabetic Neuropathy (DN) from the year 2021 to 2025. The objectives are:

- To find out the trend in DN research over time and the number of publications.
- To identify the most productive contributors, such as top authors, journals, institutions and countries involved in DN research.
- To visualize collaborative dynamics in co-authorship relationships, inter-institutional connections, and cross-national research collaborations.
- To systematically analyze DN research by identifying dominant thematic clusters and the intellectual structure of DN research through keyword co-occurrence analysis.

3. RESEARCH METHODOLOGY

The present study used a scientometric research design to systematically analyze the global research output on DN. For PubMed the search term Diabetic Neuropathy was used on 07 May 2026. PubMed was chosen because of its broad scope of biomedical coverage, its indexing system based on MeSH, and its demonstrated utility in clinical and neurological research. The first retrieval brought up a total of 1347 bibliographic records. Further screening was done, limiting the publication range of the corpus to journal articles and review articles published between 2021 and 2025. Records not included in the specified timeframe or the specified document categories were systematically excluded. The final and curated data set was then analyzed in the Biblioshiny interface of the Bibliometrix package in R to derive insight into the collaborative network analysis, the structures of keyword co-occurrence analysis, the productivity patterns, as well as the conceptual thematic formations.

4. RESULTS AND DISCUSSION

4.1) Main Information Dashboard



Fig 1: Dashboard of basic dataset characteristics

fig.1 shows the PubMed research dataset for diabetic neuropathy from 2021 to 2025. A total of 1,347 publications from 431 sources were identified with an annual growth rate of 8.42%. The total no. of authors contributed is 5325, with an average of 5.58 co-authors per document, which shows high collaboration of researchers. There were 21.38% international collaborations, with 47 papers being single-authored. There were also 2,854 keywords found in the dataset, representing a wide range of topics. The values for references and average citations per document were not changed from zero because there is no cited reference or citation count data in the standard metadata record of PubMed bibliographic exports.

4.2) Research Productivity in Diabetic Neuropathy Research

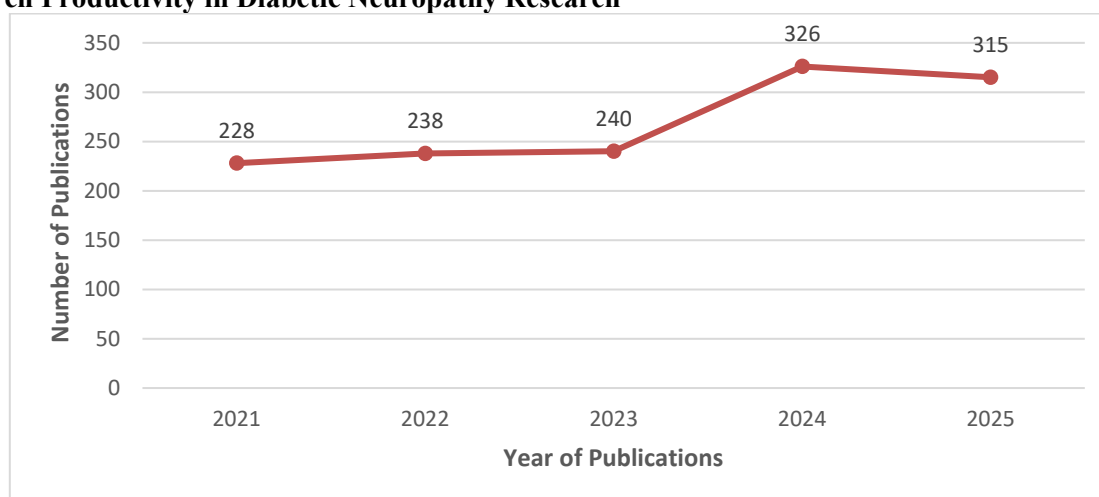


Fig 2: Scientific Production over the years

Fig.2 shows The Publication output increased by 12 (6% increase) between 2021 and 2023, increased by 80 (31%) between 2023 and 2024 (the highest year-on-year increment in the year) but decreased marginally by 11 (3%) between 2024 and 2025, most likely due to indexing lag. All these trends together indicate a combined global rise of research interest in diabetic neuropathy, driven by increasing prevalence of diabetes and a growing research emphasis during the study period.

4.3) Most Productive Authors

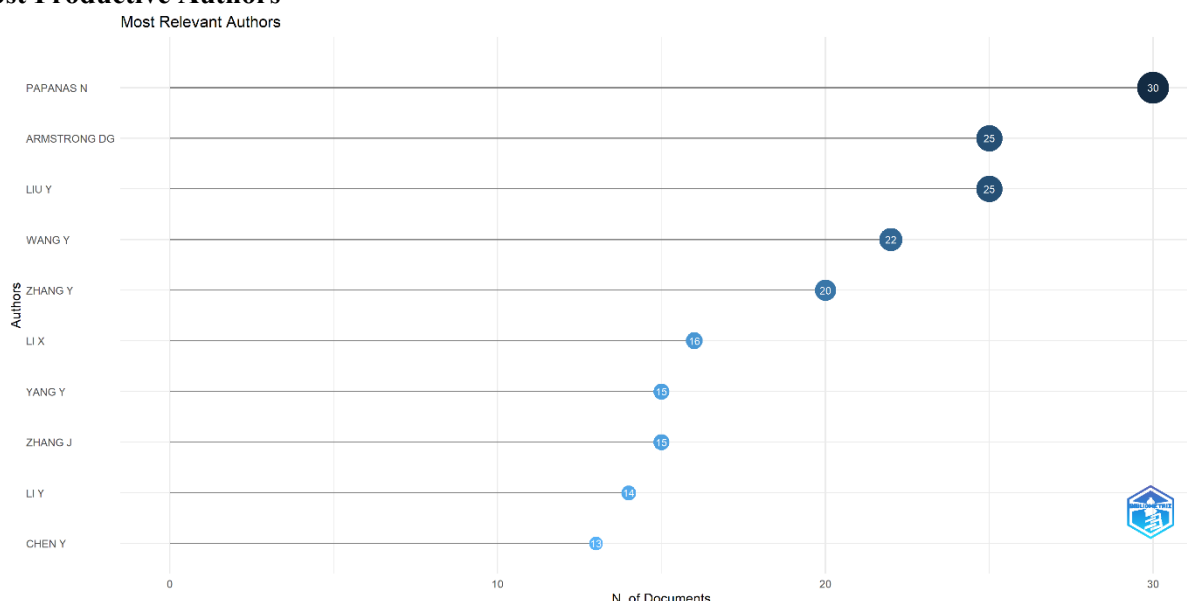


Fig 3: Top 10 Most Productive Authors

The top authors of global Diabetic Neuropathy research from 2021-2025 are shown in Fig. 3. The top three contributors were PAPANAS N (30) followed by ARMSTRONG DG (25) and LIU Y (25). WANG Y (22) and ZHANG Y (20) displayed significant research productivity as well, suggesting their active engagement in diabetic neuropathy research.

The other authors had between 13 and 16 publications, with a fairly concentrated field of authorship. There is also an evident dominance of a few highly productive researchers, which indicates the presence of established research groups and sustained academic activities.

4.4) Most Productive Sources

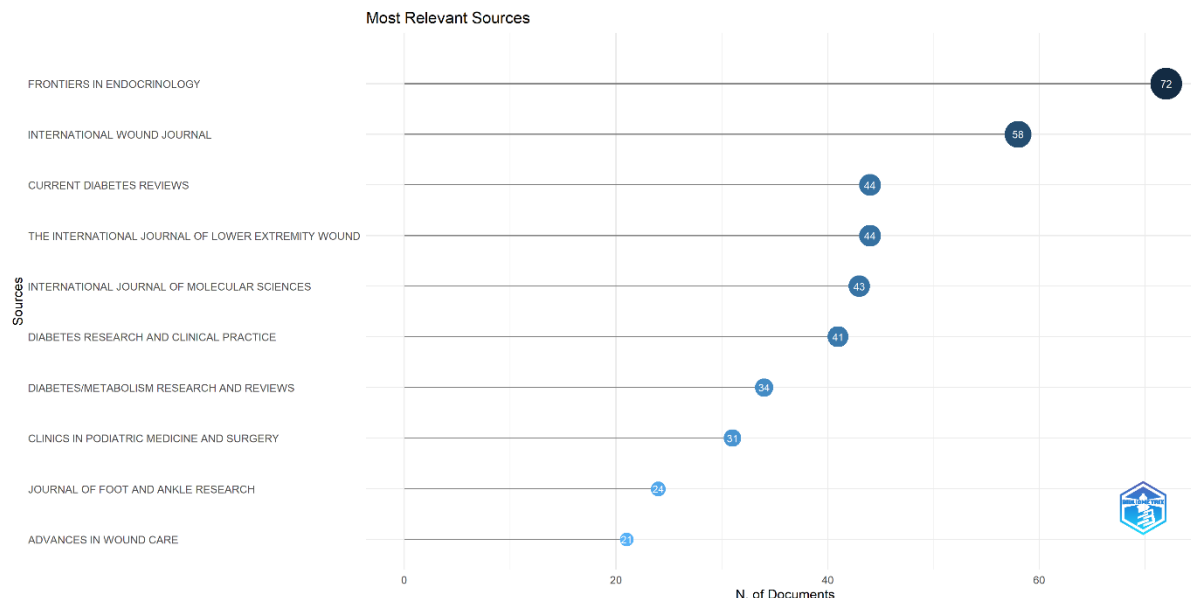


Fig 4: Top 10 Most Productive Authors

Fig. 4 gives the top 10 publication sources for research on Diabetic Neuropathy in the period 2021-2025. The most productive journal was Frontiers in Endocrinology with 72 publications, followed by International Wound Journal with 58 publications. There was also significant focus on diabetic complications and on diabetic wound management with 44 papers each for Current Diabetes Reviews and The International Journal of Lower Extremity Wounds. Other important sources were International Journal of Molecular Sciences (43) and Diabetes Research and Clinical Practice (39). Diabetic nephropathy research is found in a variety of journals, with the highest numbers in endocrinology, diabetes, podiatry and wound care journals, highlighting the multidisciplinary and clinically focused nature of the subject worldwide.

4.5) Keyword Co-occurrence Network Analysis

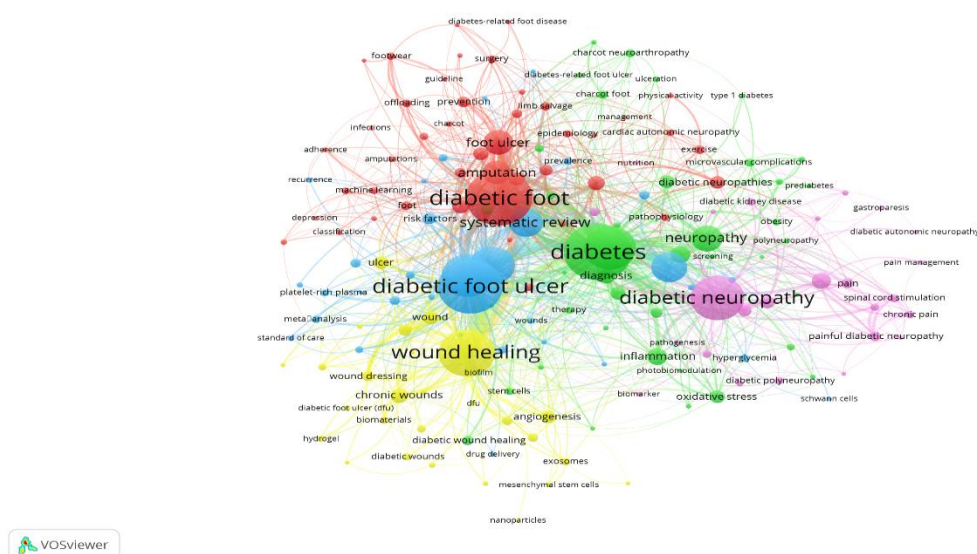


Fig 5: Network visualization of Co- Occurrence keyword

Fig. 5 shows Four main clusters were identified: blue (diabetic foot ulcer, wound healing, wound care); yellow (wound repair biomaterials, angiogenesis, stem cells); red (diabetic foot, prevention, amputation, guidelines); and green/purple (diabetes, neuropathy, pain, pathophysiology) separately with central linking nodes, "diabetes" and "diabetic foot ulcer". The node size represents the frequency of the keyword; the edge density indicates the high similarity of the thematic overlap between the two groups of nodes: the mechanisms of the neuropathy (inflammation, oxidative stress) and the clinical outcomes (ulceration, amputation) under study, suggesting the translational research between molecular pathology and wound management.

4.6) Thematic Map of Diabetic Neuropathy Research



Fig 6: Factorial Correspondence Analysis

Fig. 6 shows two clusters of thematic research. The teal cluster (right) reflects sustained scholarly interest in neuropathic pathophysiology and pain management, and summarizes neurological and complication-centric discourse, peripheral neuropathy, autonomic neuropathy, and microvascular complications. The salmon cluster (left) represents a strong clinical-trial tradition in wound care with the intervention-oriented research such as hyperbaric oxygen therapy, platelet-rich plasma, randomized controlled trials, and ulcer healing. The dimensions account for about 58% of the cumulative variance (Dim1: 29.92, Dim2: 28.73), and thus represent meaningful conceptual separation between mechanistic inquiry and therapeutic intervention as the two poles of the field.

4.7) Co-authorship Network Among Authors

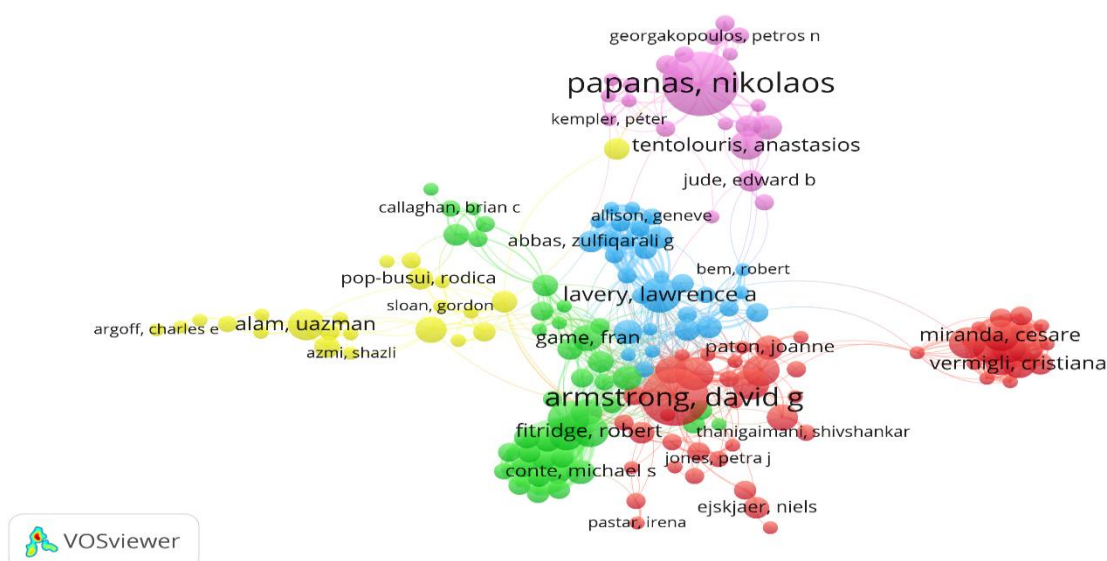


Fig 7: Network Visualization of Co-authorship among authors

Fig. 7 shows five clusters of collaboration with a rich nucleus in each. The most densely connected nodes are Armstrong, David G (red) and Lavery, Lawrence A (blue) indicating their key intellectual leadership on diabetic foot research. Papanas, Nikolaos (pink) has an independent northern group, along with Tentolouris, Anastasos, who has a strong European neuropathy scholarship. The yellow network is led by Alam, Uazman and the green group is led by Game, Fran and Fitridge. The Italian group of Miranda, Cesare and Vermigli is peripheral but separate: it makes it clear that there were collaborative traditions that were geographically specific and therefore could be considered as operating on the fringes, if not outside, of the Anglo-American research network.

4.8 Institutional Collaboration Network Analysis

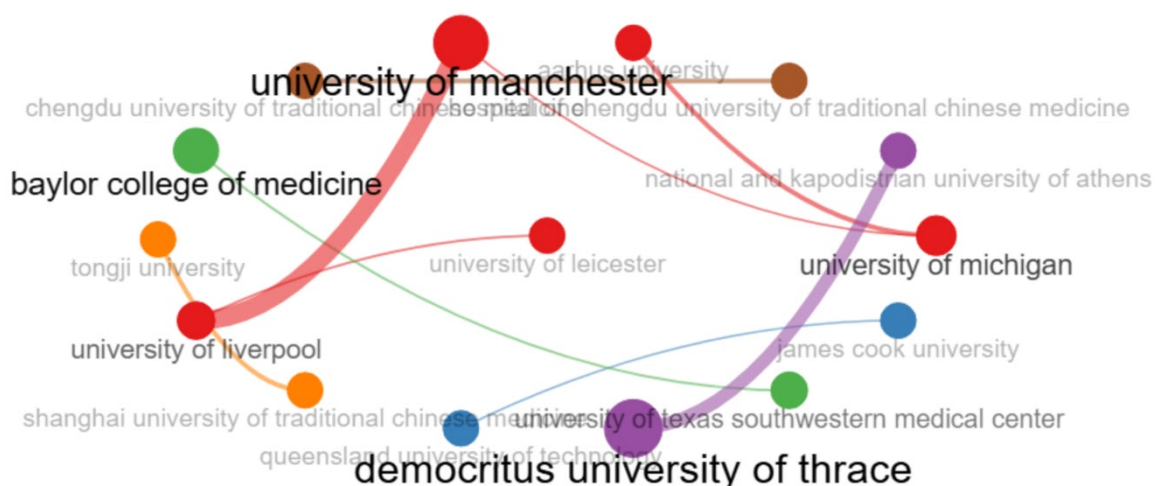


Fig 8: Institutional Collaboration Network

Fig. 8 Figure 8 shows that the University of Manchester and Democritus University of Thrace are the finest hubs because of their node prominence and edge thickness. Manchester's strongest bilateral ties with the University of Liverpool highlight an Anglo-British research corridor, with Democritus exhibiting transcontinental reach, with strong linkages with the University of Michigan and the National and Kapodistrian University of Athens. While Tongji University and Shanghai University of Traditional Chinese Medicine in China are on the outskirts but growing in importance, Baylor College of Medicine connects North American and British networks, while their contributions to the global scholarship of diabetic neuropathy continue to gradually increase.

4.9) Country Collaboration Analysis

Country Collaboration Map

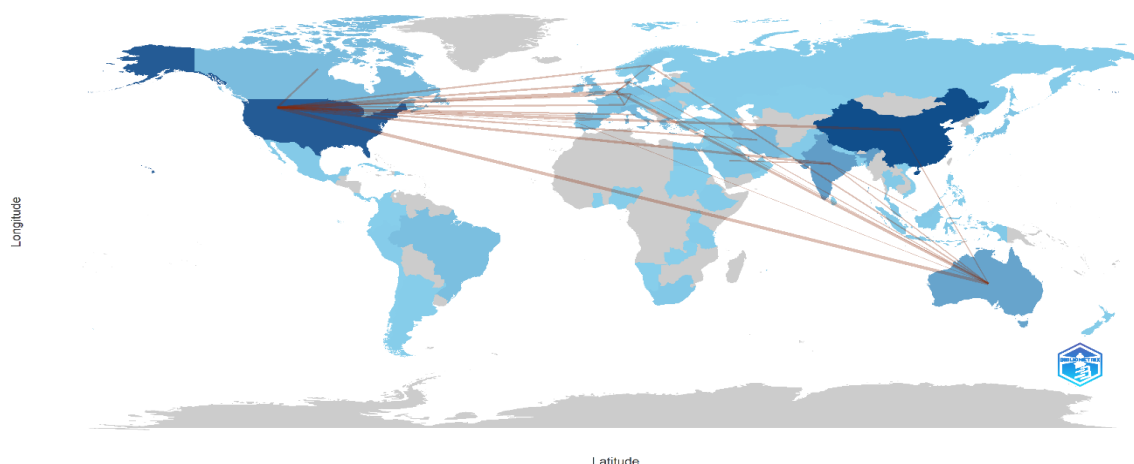


Fig 9: Country Collaboration Map

In Fig.9 it is clear that the United States is the highest-ranking global node, spreading bilateral linkages to four continents. The USA–Australia dyad (n=26) is the strongest collaborative relationship, closely followed by USA–Netherlands (n=22) and Australia–Netherlands (n=21), which is what would suggest a tight tripartite Anglo-Dutch axis. The most productive Asian partner is China (USA–China: n=18), and USA–India (n=17) indicates India's potential research that is currently not being fully leveraged. Notably, Africa and Latin America are jointly marginalized peripheral gaps that merit special capacity building interventions to achieve a truly representative diabetic neuropathy research across the globe.

5. CONCLUSION

This current scientometric study aims to give an in-depth picture of the world of research on Diabetic Neuropathy from 2021 to 2025 from the PubMed database. The results indicate a steady increase in the volume of research conducted, which reflects the increasing importance of diabetic neuropathy in the world of clinical and public health. There was high level of collaboration on research, with strong author and institutional and international collaborations driving the intellectual structure of the field. Key knowledge contributors were highly productive authors, specialised journals, and dominant institutional networks for diabetic foot disease and its complications, neuropathic pain, wound healing, and preventive intervention strategies. Thematic analyses also allowed for the visualization of conventional clinical management-aspiring research areas shifting to technologically oriented and translational research areas, such as machine learning, regenerative therapies, and biomaterial-based intervention. The interdisciplinary nature of the field was supported by the keyword mapping and the conceptual mapping. Regional gaps in collaborative participation are still clear despite significant contributions from all regions of the world, especially in developing regions. In conclusion, the study provides insightful information for researchers, clinicians, and policy makers that can inform the future directions and priorities in diabetic neuropathy research.

REFERENCES

1. Barrett, A. M., Lucero, M. A., Le, T., Robinson, R. L., Dworkin, R. H., & Chappell, A. S. (2007). Epidemiology, public health burden, and treatment of diabetic peripheral neuropathic pain: A review. *Pain Medicine*, 8(suppl 2), S50–S62. <https://doi.org/10.1111/j.1526-4637.2006.00179.x>
2. Du, S.-H., Zheng, Y.-L., Zhang, Y.-H., Wang, M.-W., & Wang, X.-Q. (2022). The last decade publications on diabetic peripheral neuropathic pain: A bibliometric analysis. *Frontiers in Molecular Neuroscience*, 15, 854000. <https://doi.org/10.3389/fnmol.2022.854000>
3. Feldman, E. L., Callaghan, B. C., Pop-Busui, R., Zochodne, D. W., Wright, D. E., Bennett, D. L., Bril, V., Russell, J. W., & Viswanathan, V. (2019). Diabetic neuropathy. *Nature Reviews Disease Primers*, 5(1), 41. <https://doi.org/10.1038/s41572-019-0092-1>
4. Gupta, B. M., Pal, R., Rohilla, L., & Dayal, D. (2021). Bibliometric analysis of diabetes research in relation to the covid-19 pandemic. *Journal of Diabetology*, 12(3), 350–356. https://doi.org/10.4103/JOD.JOD_30_21
5. Kurz, F. T., Jende, J. M., Salomir, R., Lövlblad, K.-O., Lascano, A., & Gariani, K. (2026). Diabetic peripheral neuropathy: Current epidemiology, diagnostic advances, biomarkers, and management strategies. *Journal of Diabetes Research*, 2026(1), 9080699. <https://doi.org/10.1155/jdr/9080699>
6. Savelieff, M. G., Elafros, M. A., Viswanathan, V., Jensen, T. S., Bennett, D. L., & Feldman, E. L. (2025). The global and regional burden of diabetic peripheral neuropathy. *Nature Reviews Neurology*, 21(1), 17–31. <https://doi.org/10.1038/s41582-024-01041-y>
7. Shanmugam, R., & Periyasamy, R. (2025). *Emerging trends in neurology: A multi-dimensional scientometric analysis from 2016-2025*. <https://doi.org/10.21203/rs.3.rs-8392403/v1>
8. Shen, J., Chen, J., Feng, L., & Feng, C. (2023). A scientometrics analysis and visualisation of diabetic foot research from 1955 to 2022. *International Wound Journal*, 20(4), 1072–1087. <https://doi.org/10.1111/iwj.13964>
9. Tavakoli, M., Klingelhöfer, D., Fadavi, H., & Groneberg, D. A. (2023). The landscape of global research on diabetic neuropathy. *Frontiers in Endocrinology*, 14, 1220896. <https://doi.org/10.3389/fendo.2023.1220896>
10. Ye, X.-W., Zhang, H.-X., Li, Q., Li, C.-S., Zhao, C.-J., Xia, L.-J., Ren, H.-M., Wang, X.-X., Yang, C., Wang, Y.-J., Jiang, S.-L., Xu, X.-F., & Li, X.-R. (2025). Scientometric analysis and historical review of diabetic encephalopathy research: Trends and hotspots (2004-2023). *World Journal of Diabetes*, 16(5). <https://doi.org/10.4239/wjd.v16.i5.91200>