AUTHORS

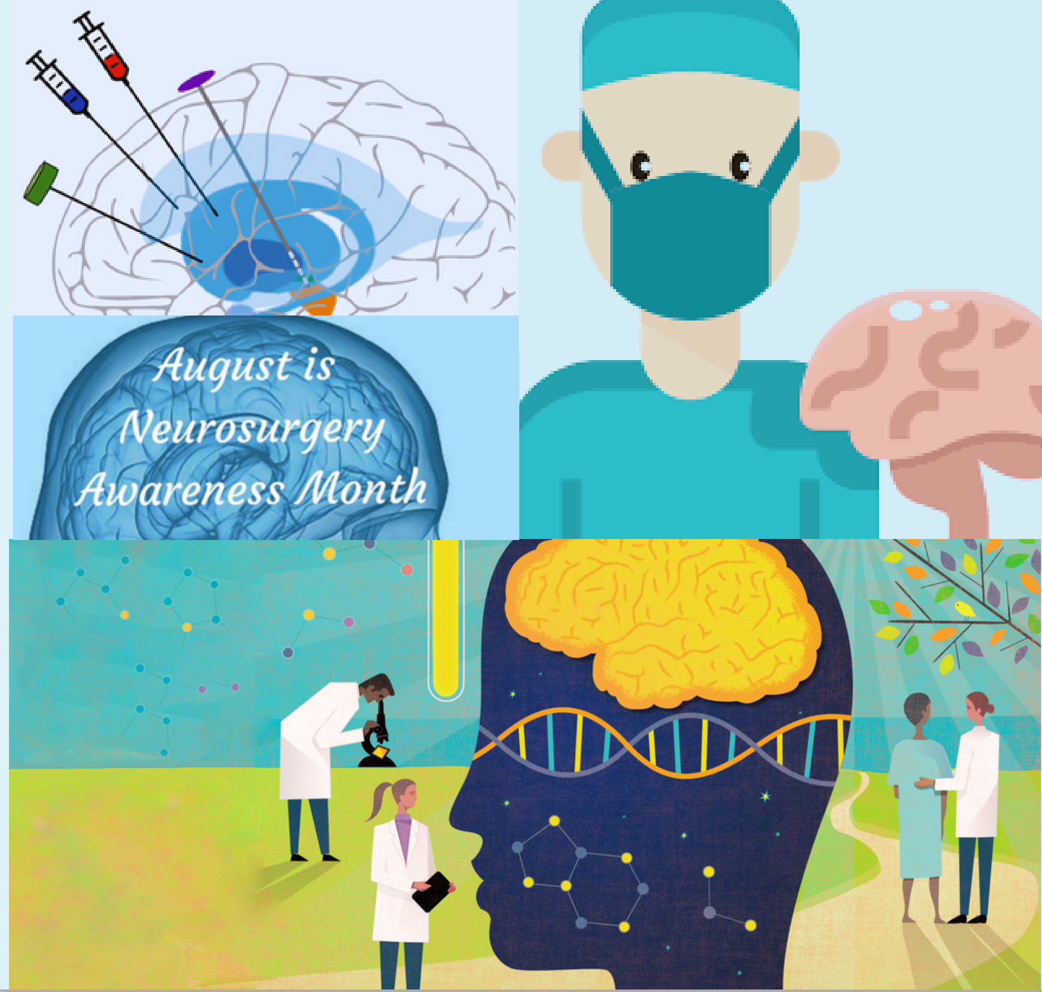
First Author: ***Fatima Khan Lookmanji***
Subsequent Authors: ***Avinna Jain*, Miyo Macario, Jimin Yoo, Thu Shun Lei, Josephine Tran, Aide Serna, Jessica Cheng, Nickol Georgy, Florence Le***
Corresponding Author: ***Michael Yan***

AFFILIATIONS

ThinkNeuro Inc.

Neurodegenerative Diseases & Neurosurgery

Unlocking the Neurosurgical Tapestry: Illuminating Pathways to Combat Neurodegenerative Diseases through Surgical Management



Bibliometric Analysis of Top 100 Cited Literature

Keywords:
Neurodegeneration, Spinal Neurosurgery, Neurosurgical Advancements, Trends in Neurosurgical Interventions

01. Introduction

Neurodegenerative diseases, such as Alzheimer's, Parkinson's, Huntington's, and amyotrophic lateral sclerosis (ALS), are growing global health issues that cause progressive neuron degeneration and a range of cognitive, motor, and functional impairments. While medical therapies are crucial in symptom management, neurosurgery emerged as a potential option, ranging from deep brain stimulation (DBS) and neuroadaptive procedures to cell-based therapies and neurorestorative approaches [1, 2]. Over the past four decades, neurosurgery has witnessed endeavors to explore utilizing neurosurgical techniques in addressing dementia, particularly Alzheimer's disease (AD) [3]. In this research poster, we review scientific literature through a bibliometric lens to examine neurodegenerative disease strategies in the evolving landscape of surgical interventions.

Objectives

- Review trends in existing neurosurgical approaches through analyzing literature regarding surgical treatment of neurodegenerative diseases.
- Provide insight to the role of neurosurgery in alleviating symptoms and successful treatments.
- Evaluate the potential risks and complications associated with neurosurgical interventions for neurodegenerative diseases, focusing on patient outcomes and safety considerations.
- Identify emerging neurosurgical techniques and technologies that promise to improve the efficacy and precision of treatments.

02. Methodology

This bibliometric analysis employed the Web of Science database, spanning its inception to July 1, 2023. A search strategy utilising "neurosurgery" AND "neurodegenerative diseases" without language or publication restrictions was employed. Inclusion criteria entailed literature published from 1994 and onwards, classified as articles, proceedings or review papers, with a minimum of three citations and relevance to the topic, while editorials and letters were excluded. Identified articles were exported to Excel, enabling data extraction of title, authors, abstracts, keywords, citations, and relevant details. Citation counts and co-authorship analysis were conducted in Excel. Data accuracy was verified, adhering to ethical considerations and database terms. Limitations included potential coverage bias and limited generalizability. The analysis can be replicated using the specified search strategy and criteria.

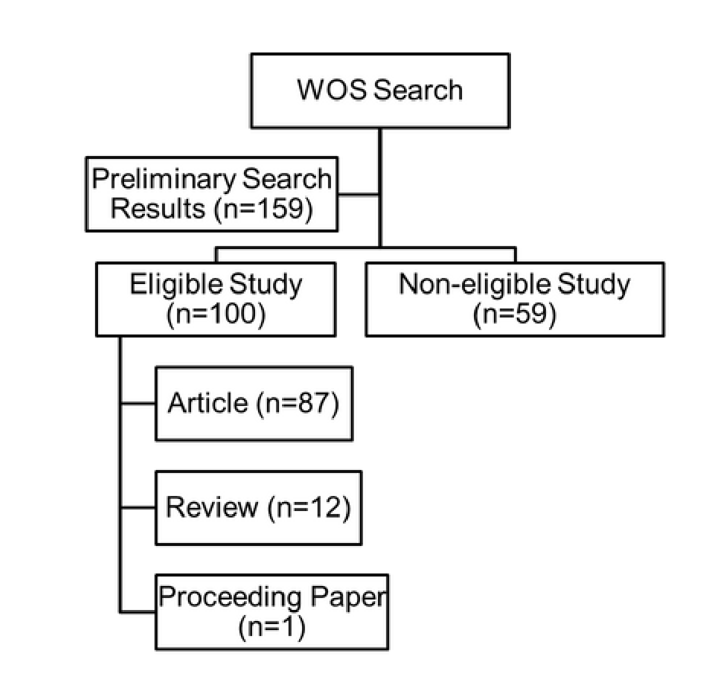


Figure 1.
A diagram outlining the step-by-step process of the literature search, visually depicting the studies that were discovered, included, and excluded at each stage.

03. Results & Findings

When sorting the top 100 cited articles, the majority of the articles were published by senior author Hidenao Sasaki, who published 48 papers on neurodegenerative diseases. Chiba University was the top institution attended by 4 senior authors. The Journal of World Neurosurgery had the highest frequency with 19 journal entries, which focused mainly on the topic of "spine". The most cited article from our top 20 articles was a journal on cancer research from senior author, Christian Schichor.

Figure 2: Senior authors with two or more papers of the 100-most cited articles on neurodegenerative diseases

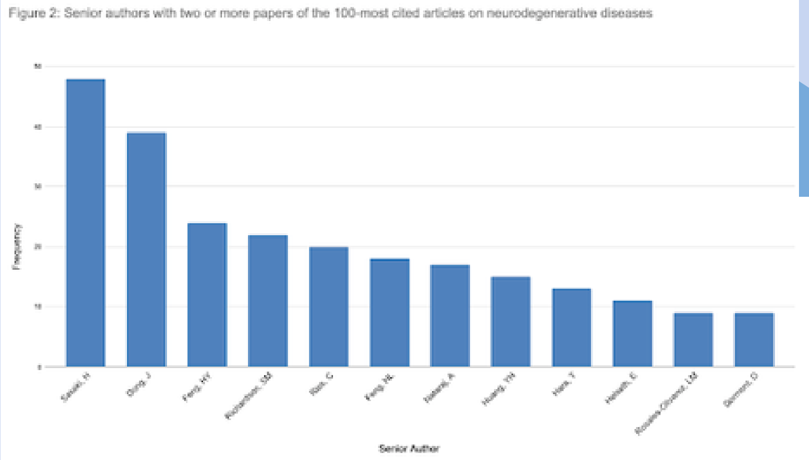


Figure 3: Senior author institution distribution

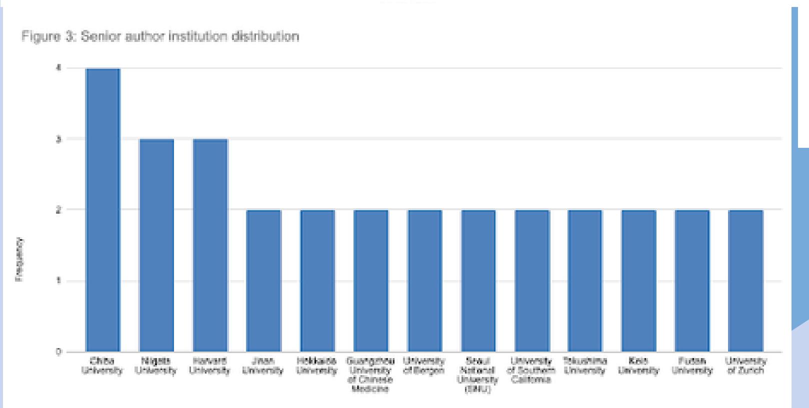


Figure 4. Journals with two or more papers of the top 100 cited articles

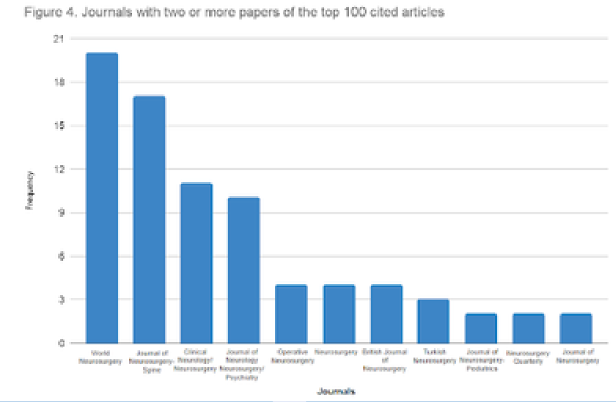


Figure 5. Topics in top 100 cited articles

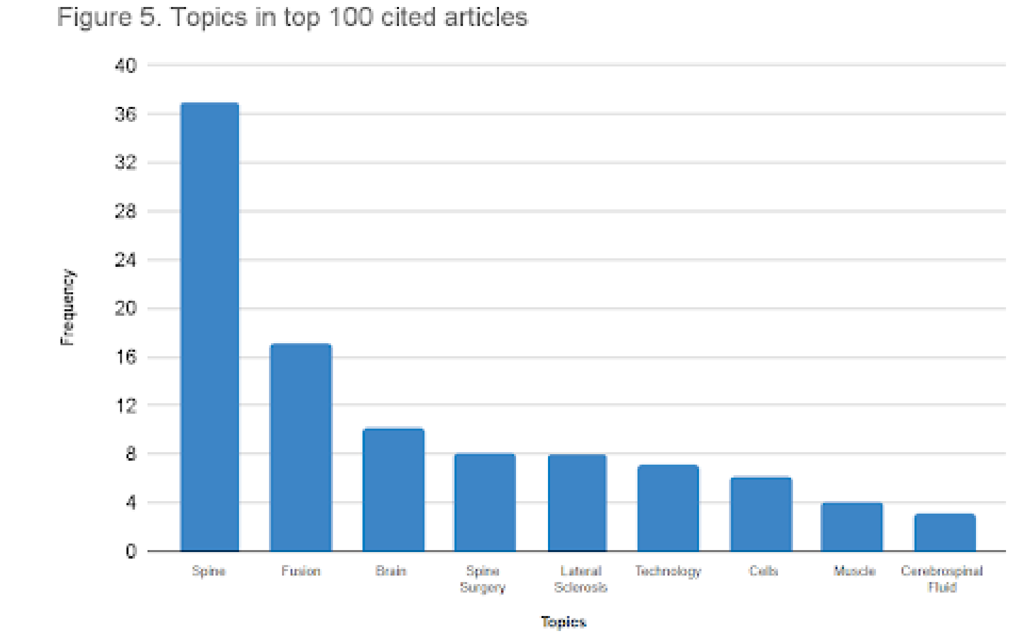


Table 5. The 20 most cited articles on Neurosurgery & Neurodegenerative diseases

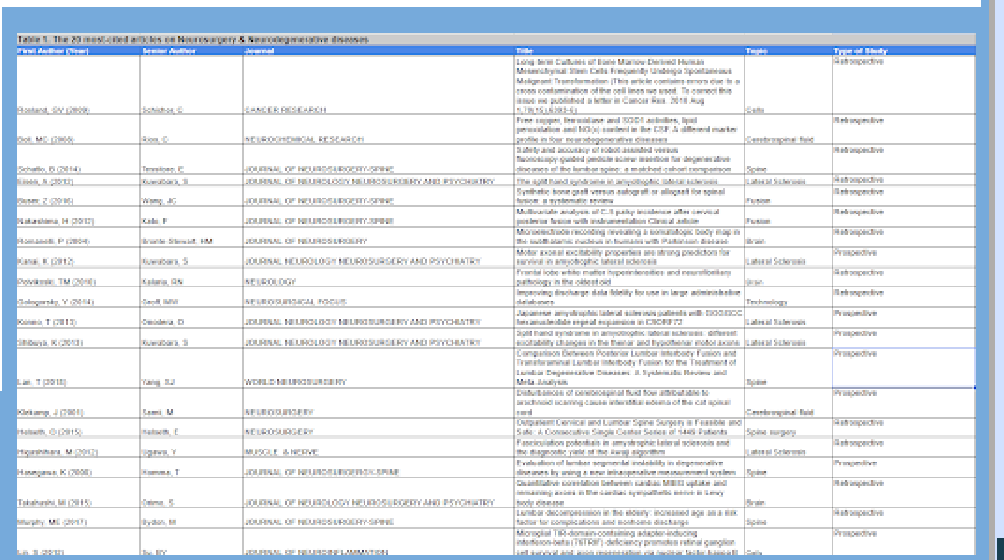


Table 1. The 100 most cited articles on Neurosurgery & Neurodegenerative diseases

04. Discussion

Despite potential limitations such as coverage bias and limited generalizability, bibliometric analysis provides a robust and reproducible search strategy that will serve as a valuable resource for future research in this field. Figure 5 shows that the most cited papers in the fields of neurosurgery and neurodegenerative diseases primarily focus on the spine. This finding highlights the importance of spine-related topics and highlights that there is room for expansion in other topics like cells, muscles, and cerebrospinal fluid. In addition, it reveals the importance and impact some topics, like the spine, make in the field of surgical management of neurodegenerative diseases. Some of the strengths of bibliometric analysis are that it can be used to classify large numbers of data as well as organize based on intuition, topic, and citations. However, it can also show weaknesses when trying to determine the standard the data will be analyzed by.

05. Conclusions

While extensive research has been performed on neurosurgery and neurodegenerative diseases relevant to spines, further investigation is warranted upon neurodegenerative diseases across various facets of the brain, encompassing brain cells, muscles, and brain structures, in order to gain an encompassing understanding of neurodegenerative diseases. Reviewing the top 20 most cited articles on neurosurgery yielded a trend in review and comparison of efficacies of current surgical therapies, including mesenchymal stem cells for cancer cell therapy. Additionally, we noticed a trend in the increased usage of AI and machine learning to improve already existing therapies for neurosurgery.

References

Li, T., Shi, L., Luo, Y., Chen, D., & Chen, Y. (2018). One-Level or Multilevel Interbody Fusion for Multilevel Lumbar Degenerative Diseases: A Prospective Randomized Control Study with a 4-Year Follow-Up. World Neurosurgery, 110, e815–e822. https://doi.org/10.1016/j.wneu.2017.11.109

Linsler, S., Ketter, R., Eichler, H., Schwerdtfeger, K., Steudel, W.-I., & Oertel, J. (2012). Red blood cell transfusion in neurosurgery. Acta Neurochirurgica, 154(7), 1303–1308. https://doi.org/10.1007/s00701-012-1373-6

Liu, F., Cao, Y., Feng, Z., Zhou, X., Jiang, C., Li, X., Chen, Z., Li, Z., Liang, Y., Jiang, X., & Dong, J. (2016). Comparison of three different posterior fixation techniques in transforaminal lumbar interbody fusion for two-level lumbar degenerative diseases: At a mean follow up time of 46 months. Clinical Neurology and Neurosurgery, 141, 1–6. https://doi.org/10.1016/j.clineuro.2015.12.002