

Neurosurgical research in Pakistan: a descriptive bibliometric analysis of developments and disparities in 25 years

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Abstract

The objective was to conduct comprehensive bibliometric studies which would offer valuable insights into neurosurgery research and training in Pakistan. We conducted a bibliometric analysis for all PubMed-indexed peer-reviewed publications from January 2000 to June 2024, where at least one author was affiliated with any neurosurgical department in Pakistan and the research was conducted in Pakistan. A significant exponential rise was seen during the 2016-20 and 2021-24 periods. Most publications were from Karachi, 651 (56.7%), Lahore, 128 (11.1%), Peshawar, 104 (9.1%) and Islamabad, 79 (6.9%). Most of the contributions were from Dr Muhammad Tariq, 79 (17.8%), Dr Syed Ather Enam, 79 (17.8%), and Dr Salman Sharif, 75 (16.9%). Most of the studies were original articles, 247 (36.2%), followed by case reports, 165 (24.2%) and review articles, 118 (17.3%). The most frequently study design used was cross-sectional, 187 (76.6%), followed by cohort, 59 (22.6%). Amongst the local PubMed-indexed journals, the Journal of Pakistan Medical Association was the most favourite local journal, representing, 154 (24.9%) of the total publications. Amongst the international journals, Surgical Neurology International and World Neurosurgery represented about, 103 (16.7%) and, 91 (14.7%) publications, respectively. The gradually rising trend in neurosurgical publications by Pakistani clinicians is a humble contribution to the global scientific literature. The progressive role of Karachi city as a flag-bearer of neurosurgical research is commendable, but it also raises questions the silence prevalent in other major cities of the country harbouring large neurosurgical setups and

teaching programmes. It is imperative to promote research initiatives in neurosurgery, and increase awareness among neurosurgical trainees and practitioners regarding the significance of active research and publications.

Keywords: Neurosurgery, Cross-sectional studies, Bibliometric analysis, Peer-reviewed, Cohort.

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Introduction

Quantitative techniques are used in bibliometrics analysis to examine patterns in a medical field study. This examination, encompassing citation numbers, authorship particulars and publication patterns, assists researchers in comprehending the overall landscape of that area. As of now, there are over 200 neurosurgeons in the country and the Pakistan Society of Neurosurgeons intends to produce and identify 400 trainees by providing them incentives and post fellowship training.¹ In 2007, Pakistan had one neurosurgeon per 5.5 million population, but by 2019, the ratio had improved to 1:1 million, with 212 neurosurgeons for 212 million people, compared to one neurosurgeon per 80,000 population in the developed countries.²

Neurosurgery has experienced tremendous growth in publications and research, notably in the fields of spine and neuro-oncology, where artificial intelligence (AI) is predominantly employed. It is worth noting that the bulk of noteworthy publications come from the United States.³ In Africa, there has been no comprehensive assessment of African neurosurgical research output in the first two decades of the 21st century.⁴ The Egyptian Society, a prominent hub in neurosurgery practice in Africa, has played a crucial role in the field, establishing a model for other low- and middle-income countries (LMICs) to follow, demonstrating the country's commitment to excellence.⁵ In the region of the Association of Southeast Asian Nations (ASEAN), it is noted that in a span of ten years from 2011-20, only 570 articles were collectively produced on neurosurgery, and that, too, were mainly from high-income countries (HICs) and upper-middle-income countries (UNICs), such as Singapore, Malaysia and Indonesia.⁶

Nearly two-thirds of all the publications in the field of

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neurosurgery in Pakistan came solely from the Agha Khan University Hospital (AKUH) in Karachi.⁷ The findings of a study conducted by Ali et al. in 2021 highlighted the existing gap in neurosurgery training in Pakistan. The study revealed discrepancies in the quality of training and infrastructure, and the impact of trainee workloads on research quality has not been thoroughly examined. Moreover, the provincial data on Gilgit-Baltistan (GB) and Balochistan remains largely unexplored.² A 2010 study showed a mere 10 publications in PubMed-indexed journals on an average per neurosurgeon in Pakistan.⁷

The current bibliometric analysis was planned to offer valuable insights into neurosurgery research and training in Pakistan, thereby informing future enhancements.

Materials and Methods

A bibliometric analysis of PubMed-indexed peer-reviewed publications from January 1, 2000, to June 30, 2024, where at least one author was affiliated with any neurosurgical department in Pakistan, and research was conducted in Pakistan.

All case reports, case series, original articles, narrative reviews, systematic reviews, letters to editor, comments, replies to letters to editor, clinical trials and editorials were included. Those excluded were literature in which the authors or the studies did not belong to Pakistan or Pakistani institutions. Besides, cadaveric and animal studies as well as non-scientific correspondence, such as news items and roll calls of reviewers, were excluded.

The PubMed National Library of Medicine database was searched by three researchers (GR, HY, and MOHJ) and the search results were cross-checked by another researcher (AAK). The search was carried out with various combinations of key words, including text words and medical subject headings (MeSH). Cross-checking was done in four rounds to ensure the validity of the search results, and to remove any selection bias, discrepancies and duplications. Any discrepancies that arose were resolved by discussion and consensus.

To stratify the data, a keyword-based search strategy was employed at three levels: country, province, and city. The initial search at the country level yielded 1,235 studies, which were subsequently filtered to 794 based on the predefined inclusion and exclusion criteria. The provincial-level search identified 526 studies, which were narrowed down to 85 after screening. Finally, the city-level search produced 2,314 studies, of which 1,149 met the eligibility criteria after filtering (Table 1).

This comprehensive search strategy was designed to maximize the retrieval of relevant studies. However, the

filtered results obtained from the country, provincial, and city-level searches (794, 85, and 1,149, respectively) contained duplicate records. Therefore, manual screening was conducted to remove duplicates. As a result, the total number of filtered studies (2,028) was further reduced to 879 unique studies (Table 1).

The search results were scrutinised for the study settings (place and time of study), study design, article type, details of authors, and name of the journal in which the study was published. To define the contributions of neurosurgical faculty, the frequency of their names appearing in publications, both as main authors and co-authors, was worked out. Trends regarding the evolution of neurosurgical research were tracked across five-year periods; 2000-05, 2006-10, 2011-15, 2016-20 and 2021-24. Data was extracted using Google Forms, and data was analysed using Microsoft Excel.

Results

Of the 2,028 items identified, the de-duplicated 879 (43.34%) studies were subjected to detailed analysis. The majority of the studies were done at the departmental level, and there was a lack of nationwide research, as was obvious from unfiltered and filtered results, with the former representing the items retrieved using the advanced search function of PubMed with the Title/Abstract filter applied, and the latter having been manually screened by the researchers using the predefined inclusion and exclusion criteria. (Table 1).

There was a wide distribution of publications from different cities of Pakistan, with majority of the publications being from Karachi, 499 (56.7%), Lahore, 98 (11.1%), Peshawar, 61 (9.1%), and Multan, 11 (1.3%), Faisalabad, four (0.4%) and Quetta, two (0.2%) contributing very little (Figure 1). Only seven major cities (Karachi, Lahore, Peshawar, Islamabad, Abbottabad, Rawalpindi, Multan) of Pakistan contributed to global neurosurgical research, representing a share of one percent or more of the total research output (Figure 1).

Most of the contributions were from Dr Muhammad Tariq, 79 (17.8%), Dr Syed Ather Enam, 79 (17.8%), Dr Salman Sharif, 75 (16.9%) (Figure 2).

A significant exponential rise was seen during the 2016-20 and 2021-24 periods (Figure 3).

Most of the studies were original articles, 247 (36.2%), followed by case reports, 165 (24.2%), and review articles, 118 (17.3%). Among the original articles published, the most frequently study design used was cross-sectional, 187 (76.6%), followed by cohort, 59 (22.6%). Case-control studies represented only, two (0.8%).

Table-1: Summary of search strategies, the key words used, and the results obtained.

	Results	Filtered Results
1st Search Strategy: Country Name		
'Neurosurgery' 'Pakistan'	1235	794
2nd Search Strategy: Province / Region Name		
'Neurosurgery' 'Punjab'	273	37
'Neurosurgery' 'Sindh'	78	37
'Neurosurgery' 'KPK'	14	7
'Neurosurgery' 'Balochistan'	0	0
'Neurosurgery' 'Gilgit'	3	2
'Neurosurgery' 'Baltistan'	1	1
'Neurosurgery' 'Kashmir'	157	1
Total	526	85
3rd Search Strategy: City Name		
'Neurosurgery' 'Lahore'	275	128
'Neurosurgery' 'Islamabad'	151	79
'Neurosurgery' 'Rawalpindi'	87	57
'Neurosurgery' 'Abbottabad'	73	59
'Neurosurgery' 'Faisalabad'	19	5
'Neurosurgery' 'Muzaffarabad'	1	0
'Neurosurgery' 'Karachi'	900	651
'Neurosurgery' 'Hyderabad'	426	1
'Neurosurgery' 'Mardan'	9	4
'Neurosurgery' 'Swabi'	74	0
'Neurosurgery' 'Quetta'	3	2
'Neurosurgery' 'Bahawalpur'	12	0
'Neurosurgery' 'Jamshoro'	20	7
'Neurosurgery' 'Peshawar'	131	104
'Neurosurgery' 'Jhelum'	6	1
'Neurosurgery' 'Gujranwala'	4	4
'Neurosurgery' 'Gujrat'	10	5
'Neurosurgery' 'Sialkot'	8	4
'Neurosurgery' 'Nowshera'	3	3
'Neurosurgery' 'Sargodha'	4	2
'Neurosurgery' 'Jhang'	18	0
'Neurosurgery' 'Sukkur'	3	0
'Neurosurgery' 'Mansehra'	1	1
'Neurosurgery' 'Swat'	5	2
'Neurosurgery' 'Wah Cantt'	2	0
'Neurosurgery' 'Nawabshah'	9	8
'Neurosurgery' 'Chilas'	10	0
'Neurosurgery' 'Narowal'	11	0
'Neurosurgery' 'Sahiwal'	3	1
'Neurosurgery' 'Larkana'	8	5
'Neurosurgery' 'Lodhran'	1	1
'Neurosurgery' 'Multan'	27	15
Total	2314	1149

Final Results

	Unfiltered Results	Filter Duplicated Results	Filtered de-duplicated Results
Total	4075	2028	879

'Neurosurgery' 'Attock', 'Neurosurgery' 'Pano Aqil', 'Neurosurgery' 'Skardu', 'Neurosurgery' 'Dera Ghazi Khan', 'Neurosurgery' 'Taxila', 'Neurosurgery' 'Bhakkar', 'Neurosurgery' 'Vehari', 'Neurosurgery' 'Sheikhupura', 'Neurosurgery' 'Mianwali', 'Neurosurgery' 'Mandi Bahauddin', 'Neurosurgery' 'Timergara', 'Neurosurgery' 'Haripur', 'Neurosurgery' 'Toba Tek Singh', 'Neurosurgery' 'Chenab Nagar', 'Neurosurgery' 'Tando Muhammad Khan', 'Neurosurgery' 'Khairpur Mir', 'Neurosurgery' 'Rawalakot', 'Neurosurgery' 'Rahim Yar Khan', 'Neurosurgery' 'Wazirabad', 'Neurosurgery' 'Kharian', 'Neurosurgery' 'Kohat', 'Neurosurgery' 'Okara', 'Neurosurgery' 'Mirpur Khas', 'Neurosurgery' 'Timergara', 'Neurosurgery' 'Gambat' revealed zero unfiltered and filtered results.

Amongst the local PubMed-indexed journals, the Journal of Pakistan Medical Association (JPMA) was the most favourite as the target journal for neurosurgical publications with, 154 (24.9%) of the total publications,

followed by the Journal of Ayub Medical College (JAMC) and the Journal of College of Physicians and Surgeons (JCPS). Amongst the international journals, Surgical Neurology International and World Neurosurgery were the target journals with 103 (16.7%) and 91 (14.7%) of the publications, respectively (Table 2).

Of the 879 items analysed, 210 (23.89%) were related to neuro-oncology, discussing a wide range of tumours, with the most commonly discussed being gliomas 70 (33.33%).

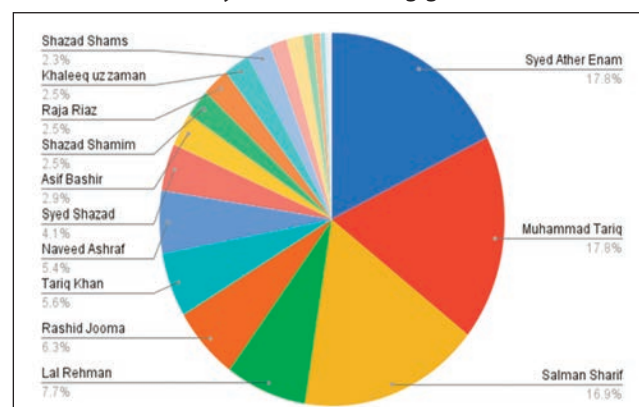
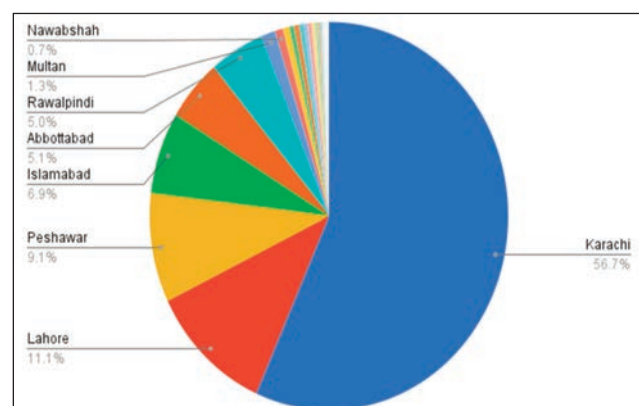
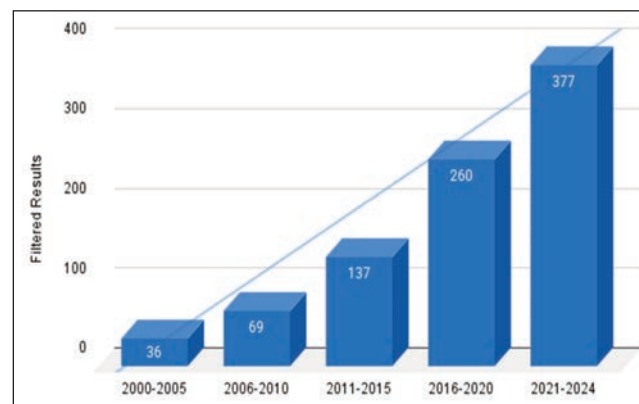
**Figure-1:** Proportion of publications from various cities of Pakistan (n=879).**Figure-2:** Proportion of neurosurgical contributions by neurosurgical faculty (n=879).**Figure-3:** The frequency of neurosurgery publications across 25 years (n=879).

Table-2: Top 12 preferred publication journals (n=618).

Journals	n (%)
Journal of Pakistan Medical Association	154 (24.92)
Surgical Neurology International	103 (16.67)
World Neurosurgery	91 (14.72)
Journal of Ayub Medical College	72 (11.65)
Journal of College of Physicians and Surgeons	56 (9.06)
Asian Journal of Neurosurgery	33 (5.34)
Neurosurgical Review	31 (5.02)
Cureus Journal of Medical Science	28 (4.53)
Child's Nervous System	14 (2.27)
Asian Spine Journal	12 (1.94)
Pakistan Journal of Medical Sciences	12 (1.94)
Neurospine	12 (1.94)
Total (n)	618** (100)

**Out of the 879 total publications identified, the study focused on the top 12 journals (n=618), which together accounted for the majority of neurosurgical publications from Pakistan. These journals were selected because they represent the most significant contributors to the neurosurgical literature in terms of volume, visibility and academic impact. Publications from other journals (n=261) were excluded from this specific table to avoid fragmentation and to maintain clarity, as their individual contribution was relatively small and scattered across numerous low-output journals. However, the overall analysis of publication trends considered all the 879(100%) articles.

Further, 26 (12.38%) items comprised general brain/spine tumour discussion, and 22(10.47%) discussed meningiomas. Overall, 145 (16.45%) publications were related to trauma.

Discussion

Based on bibliometric analysis spanning from 2000 to 2024, the landscape of neurosurgery publications in Pakistan reveals several notable trends. The temporal analysis shows a significant uptick in publications, particularly during the periods of 2016-20 and 2021-24, indicating a gradual yet steady growth in research output and improved research capabilities over time. This growth can be attributed to internet access, local research bodies, and the zest of younger neurosurgeons to get recognition for their work on the national and international stage. However, it still lags behind neighbouring countries, like China and India, not to mention the Western world, mainly due to a lack of research funding, infrastructure and dedicated research time.^{7,8} A similar trend of rise in neurosurgical publications is also seen in Africa between 2000 and 2022, but there is a large difference in output between countries, with Egypt, Morocco, Nigeria and South Africa accounting for 75.23% of all publications.⁴ Another neighbouring country, Iraq, has also shown a slow rising trend in publications with only 4 papers published from 2012 to 2016, and 12 publications per year from 2017 to 2021.⁹

Another important aspect to consider is the motivation to enhance job prospects, particularly for national or international residency programmes and higher-level training positions. In an increasingly competitive

environment, programme directors and recruiters often favour applicants with stronger resumes, and having research publications can provide a significant advantage. Across all specialties, students who match into competitive residency programmes, such as United States Medical Licensing Examination (USMLE), report to have higher than average number of research experiences.¹⁰ Whether this race of 'publish or perish' is beneficial or not is debatable, but considering that surgical speciality, such as neurosurgery, is difficult to enter abroad, applicants/ medical students / junior doctors have resorted to publications as a stepladder, leading to the trend observed in the current study.

Within Pakistan, Karachi emerges as the dominant hub for research activity, accounting for 56.7% of publications, followed distantly by Lahore (11.1%), Peshawar (9.1%) and Islamabad (6.9%). This highlights urban centres as focal points for neurosurgical research, underscoring the potential imbalance in research infrastructure across the country. Even though Lahore has more neurosurgery institutions accredited with the College of Physicians and Surgeons Pakistan (CPSP) compared to Karachi, it is far behind in terms of research publications. Another identifiable reason could be the lack of adequate and standardised medical record documentation in many public-sector hospitals of Lahore despite the high patient turnover. This issue primarily arises from the absence of an electronic medical record system, leading to poor preservation of and accessibility to patient data. Recently, the hospital management information system (HMIS) has been introduced in several public-sector hospitals across Punjab, resulting in improved record-keeping compared to the previous paper-based systems. In contrast, many reputable private-sector hospitals in Pakistan, such as AKUH, Karachi, and Dow University Hospital, have long implemented electronic medical systems (EMSs) that allow better documentation, minimise delays, and reduce discrepancies. This likely explains the better research representation from Karachi compared to Lahore.

An original article published by Waqas et al. in 2019 shows that 66.1% of the publications in the country are coming from AKUH, a private university hospital with International Organisation for Standardization (ISO) certification and Joint Commission for International Accreditation (JCIA) accreditation.⁷ This disparity in publications in Karachi and Lahore might be due to international exposure of the surgeons and professionals in Karachi-based institutions and high funding availability in Karachi compared to the government-funded institutions in Lahore.

Moreover, the analysis reveals geographic gaps in research contributions, particularly from regions like Balochistan

and smaller cities where there is scarcity of neurosurgical research facilities, and very few highly professional neurosurgeons are present, suggesting potential areas for targetted development and collaboration to foster equitable research dissemination across the country.

India has a much better research profile, with 2.82 publications per million population. Developed countries, like Japan, produce over 240 publications per million population, but several low-income African countries, such as Kenya, Libya, Gambia and Gabon, have a higher number of publications per million population than both Pakistan and India.⁷

In terms of publication types, neurosurgical publications in Pakistan primarily consist of original articles, reflecting active investigation and knowledge-creation. It may be because original articles are considered to be the original work of the author, as it helps in testing their hypothesis, and can be presented at the research conferences. Hence, researchers in Pakistan seem to be preferring this type of research. Case reports also constitute a considerable proportion in Pakistan, as it is a unique piece of work, easy to write, and does not require massive funding. Cross-sectional studies dominate the research designs, emphasising the need for more longitudinal and experimental studies to strengthen the evidential foundation in Pakistani neurosurgical research. A bibliometric analysis conducted by Kamil et al. in 2023 shows that case reports and review studies are the leading types, accounting for one-third of the articles in Southeast Asia. Arab countries have a slightly different pattern where clinical trials are the second most frequent type of study. This finding suggests that some studies require more organised research and infrastructure to support longer follow-ups and more elaborate research designs.⁶

Significant barriers in neurosurgical care and research exist in LMICs, including lack of equipment, trained professionals and availability of services at reasonable cost and distance.¹¹ Pakistani neurosurgeons have been publishing in both local and international journals.

The Pakistan Medical and Dental Council (PMDC), which is the licensing body for medical schools and health institutions, and is responsible for medical education and research, and the Higher Education Commission (HEC) have made research publications a requirement for faculty promotion. Hence, many faculty members publish articles in non-peer-reviewed journals, non-indexed journals, or journals owned by their medical colleges. However, amongst them only JAMC, JPMA and JCPSP are indexed in PubMed.¹² Hence, only a few of the medical research publications in Pakistan appear in indexed journals. The

reason the local journals are preferred is the cost involved. While international journals' publication fee ranges from United States dollar (USD) 70 to more than USD3000, the publication fee of local journals in Pakistan is less than USD60, with some having no cost at all, such as JCPSP case reports. Many government-funded hospitals lack the necessary funds to facilitate healthcare professionals with the capital involved in conducting research. Due to lack of resources and health budget constraints, effective infrastructure and equipment is usually not available for delicate neurosurgical procedures in the first and second lines of management.¹³

The World Neurosurgery, on the other hand, includes journal sections, such as "doing more with less", dedicated to the needs of the low-resource neurosurgery world.¹⁴ The Cureus Journal of Medical Science (CJMS) also provides discount to its authors according to the number of publications in the same journal. Trends of publishing research in local and international journals in Africa is 34% in the local and 66% international, with five most common journals being World Neurosurgery, Neurochirurgie, Child's Nervous System, Interdisciplinary Neurosurgery: Advanced Techniques and Case Management and the Egyptian Journal of Neurology, Psychiatry and Neurosurgery.⁴ The current review suggests that Pakistani neurosurgical researchers need more research enthusiasm, funding to publish in high-index journals, and support from the faculty in providing mentorship so that they may appear on the international forum and play a part in neurosurgical advancement.

Notably, a few prominent neurosurgery faculty members, namely Drs Muhammad Tariq, Syed Ather Enam and Salman Sharif, significantly contribute to the literature, collectively responsible for a substantial portion of the total publications. This may result from the low number of neurosurgeons within the country with a large workload and lack of incentive for academic and scholarly output. Another point to ponder is that not many female neurosurgeons are prominent in publishing journals. This fact is most likely due to few neurosurgeons in general and even fewer female surgeons in Pakistan. As of 2022, India had approximately 100-110 female neurosurgeons/neurosurgical trainees, making up 2.5-3% of the neurosurgical workforce of the country.¹⁵ A cross sectional survey conducted in public and private medical schools in Pakistan on the perception of females about neurosurgery suggested that female medical students tend to opt out of pursuing the field due to concerns, such as difficulties balancing parenting responsibilities, the absence of daycare facilities, a lack of female role models, fears of gender discrimination, and the mental and physical strain

associated with the specialty.¹⁶ According to the binary logistic regression, these factors collectively contributed to a higher likelihood of female medical students deciding not to pursue neurosurgery.¹⁶ Women can have a major role in the field of neurosurgery, and we have seen in the past how some women lead from the front, a like Louise Eisenhardt, a neuropathologist (first woman president of the Harvey Cushing Society in 1938), and female neurosurgeon Dr Shelley Timmons who became the first woman president of the, now American Association of Neurological Surgeons (AANS).¹⁵ A systematic review in 2021 showed that only 3.6% (48/1,328) of senior authors from prominent neurosurgical journals (*Journal of Neurosurgery* and *Spine*) were females who were MDs or MD/PhD affiliated with neurosurgical departments who were not neurosurgeons.¹⁷ Hence, it is imperative that female representation be encouraged in neurosurgery, for this may lead to increased academic productivity and innovation, thus benefiting the specialty. The current review highlights the need for broader participation, mentorship, spreading awareness, encouraging female editorials, and soliciting funding to cultivate a more diverse and inclusive research community within the field of neurosurgery in Pakistan and abroad.

The current review has limitations. The primary limitation is the exclusive reliance on PubMed as the sole search database. This approach neglects other significant sources that could provide a broader and more wide-ranging relevant literature. Consequently, the absence of such databases may have resulted in an underrepresentation of relevant studies and a narrower overall view of the existing literature. Google Scholar was excluded specifically due to its inclusion of papers from local journals with lax acceptance standards and a lack of competent institutional review boards (IBRs). Additionally, the review incorporates only those articles that were retrieved using specific search terminologies, such as “Neurosurgery Pakistan,” which may restrict the scope of the research. Spine surgery is common to neurosurgeons as well as orthopaedic surgeons in Pakistan. As the analysis aimed at highlighting the neurosurgical contribution, the share of spine surgery done by orthopaedic surgeons was not included. The review also primarily sourced data from major cities in Pakistan, which means that studies from smaller or less prominent cities may have been missed, leading to an incomplete representation of the country's neurosurgical landscape. It was necessary due to the lack of neurosurgical setups in the smaller cities. The review also eliminated the collaboration studies as excluding studies by non-Pakistani authors or conducted outside Pakistan removes external influence on research scope, funding and methodology, which could distort an accurate assessment of domestic

research capabilities.

Despite the limitations, however, on the basis of the findings, several recommendations can be made. It is imperative to promote research initiatives in neurosurgery across the country. Increased awareness among young neurosurgical trainees and practitioners about the importance of documenting and publishing their work is essential. Regions, like Balochistan, need to enhance their research contributions to align with the rest of the country. This can be achieved through regular conferences, research workshops, online training sessions, and mentorship programmes focussed on scientific writing, particularly targeting smaller cities. Additionally, neurosurgical setups should be established across the country rather than concentrating them solely in major urban centres.

Promoting research trends at both academic and clinical levels can optimise significant contributions from students and professionals in neurosurgery. To enhance female neurosurgeons' contribution in Pakistan, structured mentorship programmes, targeting research fellowships, and institutional support networks should be established to encourage academic participation, leadership development, and equal opportunities in neurosurgical research and practice. The allocation of a specific quota for female neurosurgeons is another potential strategy. However, this remains a debatable issue, and would require policy adjustments at the institutional and hospital levels. Funding should be allocated to underprivileged provinces, cities and institutions to support both clinical and basic research efforts. By implementing these measures, Pakistan will be able to elevate its standing in the global neurosurgical research community and make substantial advancements in the field.

Conclusion

The bibliometric analysis calls to attention the substantial growth in neurosurgical research in Pakistan over the past decade, particularly within major urban centres. However, it also illuminates disparities in research output among different regions and institutions, which may result from several barriers to clinical research, including limited funding, unprepared infrastructure, a small number of neurosurgeons, and limited knowledge of academic research. For moving forward, it is crucial to expand the research base, promote diverse study designs, provide funding, encourage gender diversity, and foster collaborations with international neurosurgical research organisations to continue advancing neurosurgical research in Pakistan and the world effectively. These efforts are essential for enhancing the overall quality of neurosurgical care and outcomes across the country.

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