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Bibliometric analysis of artificial intelligence (AI) in medical science research output from South Asian countries

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This study provides a bibliometric overview of Artificial Intelligence (AI) research in medical science across South Asia from 2015 to 2024. The analysis reveals a significant growth in research output, reflecting increasing regional engagement with AI technologies in healthcare. While the number of publications has risen sharply, the citation impact has varied, suggesting a gap between research quantity and scholarly influence. International collaborations emerged as a key factor in enhancing visibility and impact, particularly with partners from the United Kingdom, the United States, and Saudi Arabia. Review articles and contributions from select institutions demonstrated higher citation performance. Despite India's dominance in output, contributions from other South Asian countries are gaining momentum. The findings highlight the growing prominence of AI in regional medical research and underscore the importance of quality, collaboration, and interdisciplinary focus to enhance global visibility and impact.

Keywords: *Artificial intelligence, Public health, Medicine, Growth trend, Collaboration pattern, Co-citation, Co-occurrences, Co-authorship.*

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Introduction

Artificial intelligence (AI) is transforming medical science by improving diagnostic accuracy, personalising treatment, accelerating drug discovery, and enhancing patient monitoring using advanced data analytics [1], [2]. Its applications span diagnostic imaging, drug development, clinical decision-making and healthcare documentation [3].

As AI systems increasingly match or surpass human experts in diagnostic performance, debates regarding their impact on the healthcare workforce have intensified [4]. Beyond healthcare, AI influences diverse sectors such as banking, education, and manufacturing, powering innovations in search engines, content recommendation, advertising, and autonomous systems [5], [6]. Its integration into everyday life via wearable devices, email filtering, and personalised e-commerce illustrates its pervasive influence.

Since its formal inception at the 1956 Dartmouth Conference, AI has evolved rapidly through advances in computational modelling, neural networks, and data science [7], [8]. In medicine, AI leverages large datasets and machine learning (ML) algorithms to address diagnostic, prognostic, and therapeutic challenges [9]. A typical AI-driven workflow involves data acquisition, model training, and clinical translation, with applications in radiology, genomics, and clinical decision-support systems [2]. Examining AI-related medical research in South Asia is critical for understanding regional capacity, research priorities, and barriers to innovation. Given the diversity of healthcare systems and limited technological infrastructure, strategic AI integration offers opportunities to enhance clinical efficiency and accessibility [10], [11]. A bibliometric assessment of publication trends, collaboration networks, and thematic patterns can help evaluate South Asia's contribution to AI research in medical science.

Literature Review

Over the past decade, the application of artificial intelligence (AI) in medical science has expanded rapidly, driven by advancements in machine learning (ML), natural language processing (NLP), and computer vision. These technologies have facilitated breakthroughs in diagnostic imaging, predictive modelling, and precision medicine, as highlighted in studies by Wang et al. [12], and Hamamoto [13]. Islam et al. [4] provide a comprehensive overview of AI's transformative role in medicine, emphasising its multidisciplinary applications, future potential, and the growing need for ethical considerations and professional training. Similarly, Sharma et al. [9] note that AI has accelerated drug discovery, optimised clinical trials, and streamlined healthcare documentation processes. Globally, the growth of AI-related medical research has been significant since 2018, with the United States, China, and the European Union leading in publication output and technological innovation. [7] Key research domains include predictive modelling, diagnostic automation, and medical imaging, supported by the widespread use of open-source tools such as TensorFlow and PyTorch [6]. Explainable AI (XAI) methods, including SHAP and LIME, have gained prominence for enhancing interpretability and fostering clinical trust. Despite these advancements, persistent challenges remain-particularly concerning data bias, insufficient model validation, and ethical concerns around transparency, privacy, and fairness [14].

In the South Asian context, AI-driven medical research has steadily increased from 2019 to 2024, aligning with global trends while addressing regional health challenges. India leads regional output, followed by Pakistan, Bangladesh, Sri Lanka, and Nepal. [11]

This growth has been enabled by improved research infrastructure, digital health initiatives, and expanding international collaborations. However, disparities persist in terms of research quality, visibility, and citation impact. The dominant research themes include predictive modelling and clinical decision support systems, which are frequently used for disease risk assessment, patient stratification, and outcome prediction [15]. Nonetheless, many of these studies rely on small or institution-specific datasets and often lack external validation. Medical imaging and computer vision also constitute major areas of focus in the region. Soomro et al. [16] report the effective use of convolutional neural networks (CNNs) in diagnosing tuberculosis, COVID-19, and ocular diseases.

However, reproducibility and methodological transparency remain ongoing concerns. The COVID-19 pandemic further accelerated the adoption of digital health solutions, notably telemedicine and mobile health (mHealth) platforms integrated with AI for patient triage and remote monitoring [17]. While these technologies have improved healthcare accessibility, their long-term clinical efficacy and cost-effectiveness still require rigorous evaluation. In the field of NLP and medical informatics, research is expanding in areas such as electronic health record (EHR) mining, automated clinical documentation, and multilingual patient communication. [18] However, development is hindered by limited access to de-identified health data and a lack of annotated corpora in South Asian languages. While open-source Python libraries have enhanced access to AI tools, they have also led to inconsistent methodological standards and reproducibility issues.

Institutionally, India's leadership is supported by premier organisations such as the All India Institute of Medical Sciences (AIIMS) and the Indian Institutes of Technology (IITs), further backed by national digital health policies and AI innovation programs. [19] Meanwhile, countries like Pakistan, Bangladesh, Sri Lanka, and Nepal are building research capacity through regional and international partnerships, although output remains concentrated within a few elite institutions. [20], [21] Key structural barriers include weak data-sharing frameworks, fragmented regulatory oversight, and limited cross-border collaboration [11]. Overall, AI is reshaping both global and regional medical research by advancing diagnostic accuracy, therapeutic personalisation, and healthcare system efficiency. However, in South Asia, the field remains in a developmental phase marked by variable data quality, limited validation, and a lack of interdisciplinary integration. A systematic bibliometric review can thus serve as a valuable tool to clarify research trends, collaboration networks, and thematic priorities, ultimately providing evidence-based insights to strengthen regional AI capabilities in medical science.

Research Questions

RQ1: What are the publication and citation trends of AI research in medical science in South Asian countries?

RQ2: Who are the leading authors, institutions, and contributing countries in this domain?

RQ3: What are the social and conceptual structures of AI-related medical science research in South Asia?

RQ4: What are the dominant research themes shaping this regional field?

Materials and Methods

A systematic literature search was conducted in Scopus on 20 January 2025 to identify publications on AI in medical science from South Asia (2015–2024 period). The search combined AI- and medicine-related keywords in the TITLE field and was filtered for eight South Asian countries. Figure 1 presents the PRISMA flow diagram for identifying and selecting the Scopus publications, which yielded 1,020 records after refinement and removal of duplicates. Bibliographic metadata from these publications were exported and analysed using Scopus analytics for descriptive statistics on publication trends, country contributions and citation impact. Advanced bibliometric network analyses, including co-authorship and keyword co-occurrence, were performed with VOSviewer and Biblioshiny to map collaboration patterns, thematic focus, and intellectual structure. The final analysis focused on five countries (India, Pakistan, Bangladesh, Nepal, and Sri Lanka) with substantial output, ensuring robust quantitative and network visualisation.

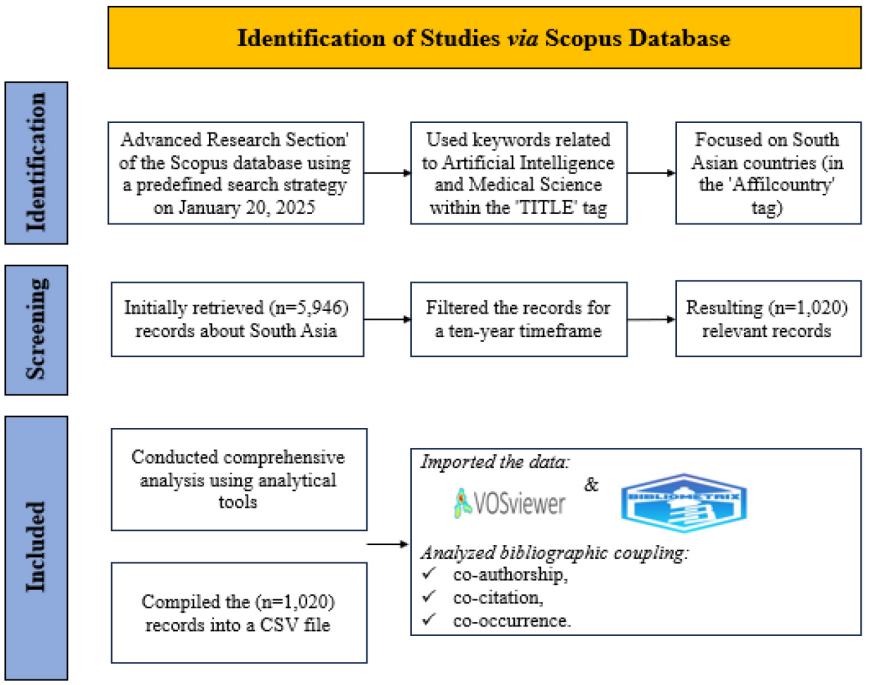

Figure 1

PRISMA flow diagram for identifying Scopus publications within Artificial Intelligence in Medical Science

Analysis and Results Interpretation

Publication Growth

Figure 2 shows a significant increase in AI-related medical science publications from South Asia over the past decade. The total number of publications grew sharply from just one in 2015 to 387 in 2024, reflecting increasing interest and investment in this interdisciplinary field. This growth highlights the region's expanding engagement with AI in healthcare, which is keeping pace with global research trends. Despite this surge in publications, the impact of these studies, as measured by the number of citations, has declined in recent years. Citations per publication peaked at 28.75 in 2018 but fell to 1.44 by 2024, likely because many recent papers were too new to have been widely cited. Total citations reached a maximum of 1,806 in 2021 across 93 papers, showing that the most influential studies appeared earlier in the decade, even when fewer papers were published. The relative citation index also dropped from 3.09 in 2018 to 0.15 in 2024, suggesting that while the quantity of research has grown, the number of highly impactful studies has not kept pace. Funding and collaboration have increased alongside publication output. In 2024, 42 papers received funding, and 135 involved international collaboration, reflecting stronger support for research and greater integration into global scientific networks. However, only 21 highly cited papers were identified over the decade, most of which were published between 2019 and 2022, indicating that influential work is still concentrated in a small subset of studies.

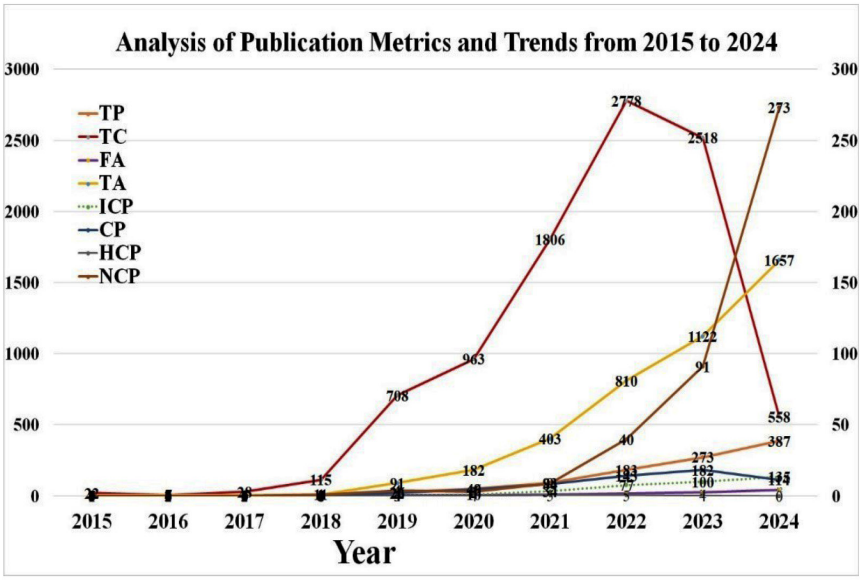

Figure 2

Analysis of Publication Metrics and Trends from 2015 to 2024

Subject Area and Collaboration Patterns in AI-Driven Medical Science Research in South Asia

Table 1 shows that AI-related medical science research in South Asia has experienced rapid growth and clear specialisation patterns. Science and Technology led in output, accounting for nearly 40% of publications (697) and 35.6% of citations (5,596), with an average of 8.03 citations per paper. Health Sciences, representing 22.2% of publications (389), achieved slightly higher per-paper impact (9.17 citations). Smaller fields, such as Life Sciences (7.36%) and Environmental and Energy Sciences (6.05%), stood out for their influence, with average citations of 14.22 and 12.26, respectively, highlighting the impact of focused, specialised research within the broader AI-medical landscape.

The citation patterns were highly uneven. Over 41% of papers remained uncited, while fewer than 5% of HCPs with more than 50 citations contributed a disproportionate share of the total citations. The citation impact rose sharply across the higher brackets, peaking at 152.3 citations per paper in the top tier (101–334 citations) with a relative citation index of 16.35. High-impact publications are also closely associated with funding and international collaboration: 75% of top-tier papers involved international co-authorship, compared with only 26% of uncited works. Larger research teams correlated with greater influence, averaging 7.31 authors per paper in the 51–100 citation range, emphasising the value of collaboration in enhancing the visibility and impact of research.

International collaboration has emerged as a key driver of research prominence. Internationally collaborative papers (ICPs) represented 35.6% of publications (363 papers) but accounted for 63.3% of citations (6,014), averaging 16.75 citations per paper and a relative citation index of 1.78, well above that of national collaborations (CPP 5.74, RCI 0.62) or single-institution studies (CPP 4.80, RCI 0.52). ICPs also involved larger teams, averaging 5.80 authors compared with 4.00 in national collaborations and 2.66 in single

Table 1

Distribution of Collaboration Types

Type of Collaboration	TP	TC	CPP	% TP	TA	AAPP	FA	RCI	CRP	HCP
Single Institution or Country Paper	327	1571	4.80	32.06	869	2.66	17	0.52	168	1
National Collaborative Papers	334	1918	5.74	32.75	1337	4.00	16	0.62	178	4
ICP=International Collaborative Papers	363	6014	16.75	35.59	2085	5.80	72	1.78	253	16
ICP-Bilateral	218	2809	12.89	21.37	980	4.55	30	1.38	144	8
ICP-Multilateral	145	3205	22.10	14.12	1105	7.67	42	2.37	109	8
Total Papers	1020	9503	9.32	100.00	4291	4.20	105	1.00	599	21

TP=Total Publication; TC=Total Citations; CPP=Citations Per Paper; TA=Total Authors; AAPP=Average Authors per Paper; FP=Funded papers; RCI=Relative Citation Index; CRP=Citation Received Papers; HCP=Highly Cited Publications

institution studies. Multilateral ICPs, though only 14.1% of publications (145 papers), were particularly impactful, averaging 22.10 citations, an RCI of 2.37, and 7.67 authors per paper, and contributed eight of the 21 HCPs (38%). Bilateral ICPs also performed well (CPP 12.89, RCI 1.38), although slightly below multilateral efforts.

Publication Types and Their Impact

Table 2 shows the clear differences in impact across publication types in AI-related medical science research in South Asia. Book chapters account for the largest share of publications (28.63%) but have low influence, with an average of 2.40 CPP, an RCI of 0.26, and no HCPs. Conference papers (23.82%) showed moderate performance, with a CPP of 5.27, an RCI of 0.57, limited funding, and modest international collaboration (17.70%). Journal articles (23.73% of output) were the most influential in terms of volume and citations, accumulating 3,547 citations, a CPP of 14.66, an RCI of 1.57, and producing six HCPs. Reviews, although fewer in number (11.18%), demonstrated the greatest scholarly impact, with a CPP of 30.04, an RCI of 3.22, and more than half involving international collaboration (52.63%). Other formats, including books, letters, and editorials, contributed little to the overall impact, each showing low CPP and RCI values. Interestingly, retracted publications (0.49%) had a relatively high CPP of 16.00 and an RCI of 1.72, highlighting the unintended influence of controversial work. A single short survey, although comprising only 0.10% of the dataset, stood out with a remarkable CPP of 91.00 and the highest RCI of 9.77, emphasising the potential impact of even rare publication types.

Table 2

Distribution of Publication Types

Document Type	TP	TC	CPP	%TP	TA	AAPP	FP	CRP	HCP	ICP	%ICP	RCI
Book Chapter	292	702	2.40	28.63	1003	3.43	0	124	0	82	28.08	0.26
Conference Paper	243	1280	5.27	23.82	970	3.99	17	134	3	43	17.70	0.57
Article	242	3547	14.66	23.73	1306	5.40	51	184	6	123	50.83	1.57
Review	114	3425	30.04	11.18	633	5.55	34	99	11	60	52.63	3.22
Book	38	58	1.53	3.73	122	3.21	0	15	0	19	50.00	0.16
Letter	36	215	5.97	3.53	108	3.00	2	20	1	14	38.89	0.64
Editorial	34	82	2.41	3.33	82	2.41	0	10	0	13	38.24	0.26
Note	12	23	1.92	1.18	31	2.58	0	7	0	3	25.00	0.21
Retracted	5	80	16.00	0.49	25	5.00	1	5	0	4	80.00	1.72
Erratum	3	0	0.00	0.29	8	2.66	0	0	0	2	66.67	0.00
Short Survey	1	91	91.00	0.10	3	3.00	0	1	0	0	0.00	9.77
Total	1020	9503	9.32	100.00	4291	4.20	105	599	21	363	35.20	1.00

TP=Total Publication; TC=Total Citations; CPP=Citations Per Paper; FP=Funded papers; TA=Total Authors; AAPP=Average Authors per Paper; CRP=Citation Received Papers; HCP=Highly Cited Publications; ICP=International Collaborative Papers; RCI=Relative Citation Index

Distribution of Papers Among South Asian Countries

AI research in medical science in South Asia is overwhelmingly led by India, which produced 925 publications and received 7,836 citations, yielding a citation per publication (CPP) of 8.47. India also dominates ICPs, contributing 300 publications, including 188 bilateral and 112 multilateral partnerships, reflecting their central role in regional and global research networks. Although Pakistan and Bangladesh have fewer publications (70 and 33, respectively), they demonstrate a higher citation impact per article, with CPP values of 18.53 and 21.84, respectively. Both countries are active in international collaborations, contributing 52 ICPs from Pakistan and 22 from Bangladesh, underscoring their engagement in cross-border research despite their smaller output. Smaller contributors, including Nepal, Sri Lanka, and Afghanistan, had limited publications but varied influence. Nepal's CPP stands at 12.88, Afghanistan achieves a notably high CPP of 57.50 from only two publications, and Sri Lanka records a lower CPP of 1.80, highlighting uneven citation patterns across South Asia. All of South Asia's 1,043 publications comprised 326 single-institution papers, 330 national collaborations, and 386 international collaborations. Among international collaborations, 223 were bilateral and 163 were multilateral, emphasising the importance of collaborative partnerships in enhancing research quality, visibility, and impact.

Impact of Top Foreign Collaborators in South Asia

International collaboration plays a crucial role in South Asia's AI-related medical science research. Among the top 10 foreign partners, the United States leads in publication volume with 94 papers, achieving a CPP of 16.74, 66 citation-receiving publications, and

Table 3

Contribution and Impact of the Top 10 Leading International Collaborators

Sl. No.	Name of the Foreign Country	TP	TC	CPP	FP	CRP	HCP
1	United States	94	1574	16.74	19	66	3
2	United Kingdom	56	1738	31.04	16	45	4
3	Saudi Arabia	48	549	11.44	14	38	1
4	China	26	463	17.81	11	14	2
5	Australia	22	763	34.68	5	17	3
6	Malaysia	21	406	19.33	2	16	1
7	Canada	21	603	28.71	8	20	0
8	United Arab Emirates	19	300	15.79	5	11	1
9	Nigeria	15	75	5.00	0	10	0
10	Italy	14	289	20.64	2	13	0
Other Countries (78 Countries)		302	5970	19.77	76	222	13

TP=Total Publication; TC=Total Citations; CPP=Citations Per Paper; FP=Funded papers; TA=Total Authors; AAPP=Average Authors per Paper; CRP=Citation Received Papers; HCP=Highly Cited Publications

three HCP publications. The United Kingdom, although producing fewer papers (56), demonstrated the highest CPP of 31.04 and contributed the most HCPs (4), reflecting the quality and influence of its collaborations. Australia also stands out with a CPP of 34.68 from 22 publications, emphasising its strong research impact. Other significant contributors include Canada (CPP 28.71), China (CPP 17.81), and Malaysia (CPP 19.33), illustrating a diverse global network that enhances the visibility and reach of South Asian studies. In contrast, Nigeria, despite being among the top 10 collaborators, had a lower CPP of 5.00, indicating a more limited influence. Beyond these leading partners, 78 additional countries contributed 302 publications with a combined CPP of 19.77, highlighting the breadth of international engagement (Table 3).

Global Collaboration Network in South Asian AI Medical Research

A total of 94 countries contributed to the 1,020 publications that were analysed. Applying a threshold of at least three publications per country, 57 countries qualified, with the top 50 selected for network visualisation using VOSviewer software. The resulting network comprised 50 countries organised into nine clusters, connected by 379 collaboration links with a total link strength (TLS) of 1,083. Cluster sizes varied, with Cluster 1 containing nine countries, Clusters 2 and 3 containing eight countries each, Clusters 4 and 5 containing six countries each, Cluster 6 containing five countries, Cluster 7 containing four countries, Cluster 8 containing three countries, and Cluster 9 containing one country. This structure

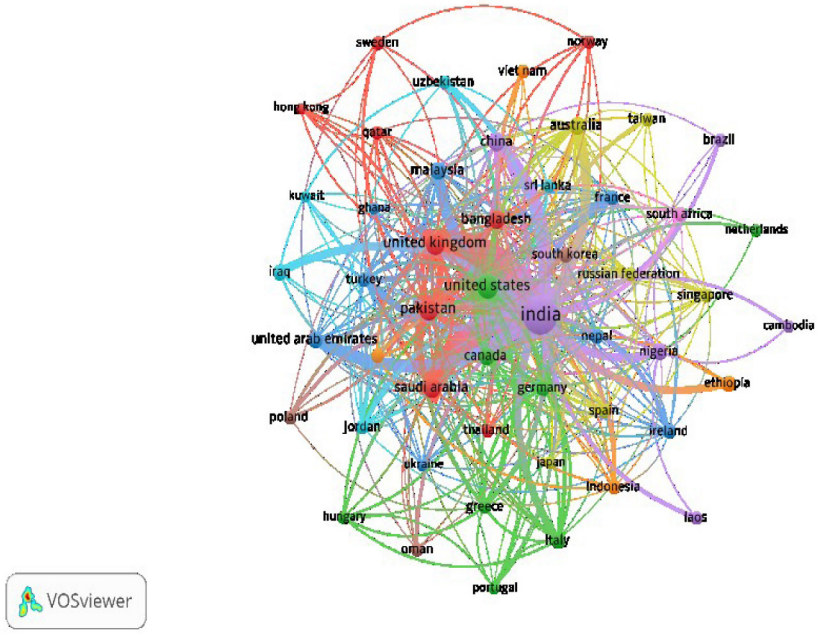

Figure 3

Collaboration network of the top 50 countries

highlights diverse collaborative groupings and points to the potential for greater inclusion of underrepresented countries. The analysis identified India as the central hub of international collaboration in this research domain. The observed clustering patterns suggest that regional partnerships are influenced by shared socioeconomic conditions or common research interests. Simultaneously, several countries remain on the network periphery, indicating opportunities to expand global engagement and strengthen South Asia's presence in AI-driven medical science research (Figure 3).

Most Prolific Authors

Among the 3,908 authors contributing to AI research in medical science, the majority (3,887) published only one to three papers, indicating a highly dispersed authorship pattern in this field. Only 18 authors produced four to five papers, and an even smaller group published between six and twelve papers. The top 14 authors collectively contributed 91 publications (8.92% of total publications) and accounted for 3,548 citations (35.27% of TC), highlighting their significant influence. Wiwanitkit, V. (Dr DY Patil University, India) led in publication count with 12 papers; however, his citation impact was low, with a CPP of 0.83 and an RCI of 0.08, despite a 75% rate of international collaboration. In contrast, Suri, J.S. (Symbiosis Institute of Technology, India), and Dwivedi, Y.K. (Symbiosis International University, India) published five and four papers, respectively, but achieved a much higher impact. Suri recorded a CPP of 32.40 and an RCI of 3.29, while Dwivedi reached a CPP of 97.00 and an RCI of 9.84, with all publications involving international collaboration (100% ICP). Hameed, B.M.Z. (Father Muller Medical College, India) and Shah, M. (International Training and Research in Uro-Oncology, India) authored three papers each, collectively receiving 346 citations, resulting in a CPP of 115.33 and RCI of 11.69, with 100% international collaboration. Similarly, Naik, N. (Manipal Academy of Higher Education, India) produced four papers with a CPP of 86.50 and an RCI of 8.77, 75% of which were internationally collaborative. In contrast, Shaikh, T.A., Kaur, J., Ray, P.P., and Sharma, S. contributed five to seven publications each but had lower citation impact (CPP 2.80–10.60; RCI 0.28–1.07) and no international collaborations, indicating that limited global engagement may reduce visibility and influence (Table 4).

Table 4

Most prolific and influential authors

Sl. No.	Author	Affiliation	TP	TC	CPP	FP	ICP	%ICP	RCI
MOST PRODUCTIVE AUTHORS									
1	Wiwanitkit, Viroj	Dr DY Patil University, Pune, India	12	10	0.83	0	9	75.00	0.08
2	Sharma, Sachin	Graphic Era Deemed to be University, Dehradun, India	7	25	3.57	0	0	0.00	0.36
3	Suri, Jasjit S.	Symbiosis Institute of Technology, Nagpur, India	5	162	32.40	0	5	100.00	3.29

Contd...

4	Shaikh, Tawseef Ayoub	National Institute of Technology, Srinagar, India	5	53	10.60	1	0	0.00	1.07
5	Kaur, Jaspreet	Chandigarh University, Mohali, India	5	52	10.40	0	0	0.00	1.05
6	Ray, Partha Pratim	Sikkim University, Gangtok, India	5	14	2.80	0	0	0.00	0.28
7	Dwivedi, Yogesh K.	Symbiosis International (Deemed University), Pune, India	4	388	97.00	0	4	100.00	9.84
MOST IMPACTFUL AUTHORS									
1	Naik, Nithesh	Manipal Academy of Higher Education, Manipal, India	4	346	86.50	0	3	75.00	8.77
2	Paul, Sudip	North-Eastern Hill University, Shillong, India	4	156	39.00	0	2	50.00	3.95
3	Hameed, B. M. Zeeshan	Father Muller Medical College, Mangalore, India	3	346	115.33	0	3	100.00	11.69
4	Shah, Milap	International Training and Research in Uro-Oncology and Endourology Group, Manipal, India	3	346	115.33	0	3	100.00	11.69
5	Kumar, Ashwani	Indian Institute of Management Rohtak, India	3	171	57.00	0	2	66.67	5.78
6	Gupta, Deepak	Guru Gobind Singh Indraprastha University, Delhi, India	3	148	49.33	0	1	33.33	5.00
7	Rahman, Md. Habibur	Southeast University, Dhaka, Bangladesh	2	150	75.00	0	2	100.00	7.61

TP=Total Publication; TC=Total Citations; CPP=Citations Per Paper; FP=Funded papers; ICP=International Collaborative Papers; RCI=Relative Citation Index

Co-Authorship Network Analysis

The co-authorship network maps collaboration patterns among 3,908 authors in AI-related medical science. To ensure a focused analysis, only authors with at least three publications and three citations were included, resulting in 50 authors who met this threshold. The network revealed 29 distinct clusters connected by 56 collaboration links, with a TLS of 153. Cluster 1 was the largest, comprising ten authors and represented in red. Clusters 2 and 3 each included four authors, shown in green and blue, respectively, whereas Cluster 4 contained three authors, depicted in yellow. Clusters 5–8 consisted of two authors each, and Clusters 9–29 were composed of single authors, indicating limited or individual collaboration. As illustrated in Figure 4, the clustering patterns highlight both established

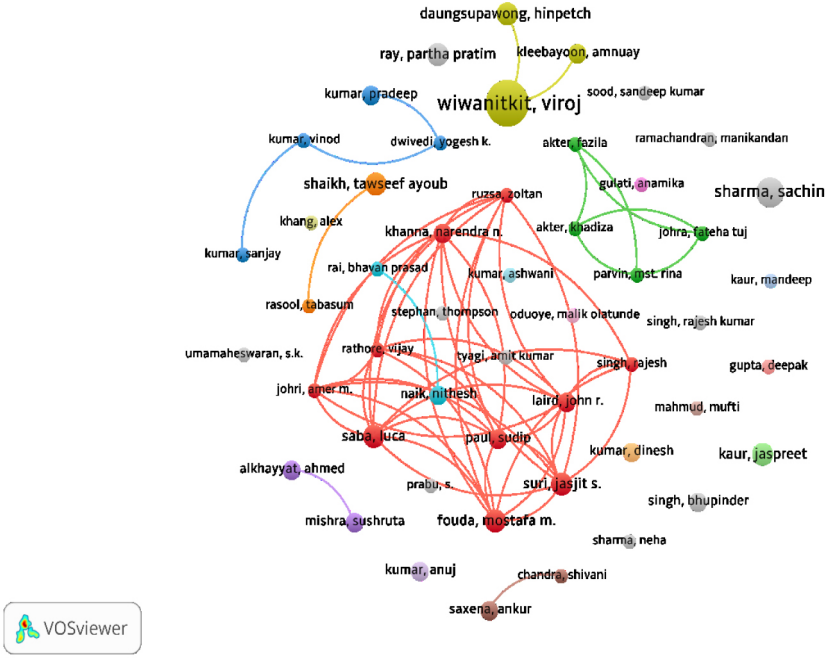

Figure 4

Authors' co-authorship network map of the top 50 authors

collaborative networks and areas where co-authorship could be strengthened, providing insights into the structure and connectivity of research partnerships in the field.

Most Productive Affiliations

A total of 1,729 institutions contributed to AI research in the medical sciences. The majority (1,680) published one to five papers, 32 published six to ten, eight contributed 11–20, and nine published 21–38 papers. The 14 most productive institutions accounted for 293 publications (16.94% of TP) and 3,306 citations (34.78% of TC) (Table 5).

Graphic Era (Deemed to be University), Dehradun, was the most prolific institution, with 38 publications. Amity University, Noida, and SRM Institute of Science and Technology followed closely, each producing 30 publications. Symbiosis International (Deemed University) Pune, recorded the highest total citations (468), while UPES, Dehradun, and Kasturba Medical College, Manipal achieved 457 and 415 citations, respectively. Kasturba Medical College and Manipal Institute of Technology demonstrated remarkable citation efficiency with CPP values of 83.00 and 69.20, respectively. Kasturba Medical College also attained an RCI of 8.42, well above the global average, whereas Graphic Era University, despite its high publication count, had a modest RCI of 0.27. North South University, Dhaka, contributed five publications, all of which were internationally collaborative (100% ICP), reflecting strong global engagement.

Table 5

The most prolific and influential organisations

Sl. No.	Organisation	TP	TC	CPP	FP	ICP	%ICP	RCI
MOST PRODUCTIVE ORGANISATIONS								
1	Graphic Era (Deemed to be University), Dehradun, India	38	101	2.66	0	11	28.95	0.27
2	Amity University Noida, India	30	214	7.13	0	5	16.67	0.72
3	SRM Institute of Science and Technology	30	131	4.37	5	8	26.67	0.44
4	Chitkara University, Punjab, India	28	225	8.04	4	13	46.43	0.81
5	Chandigarh University, Mohali, India	25	94	3.76	1	7	28	0.38
6	SIMATS Chennai, India	24	159	6.63	1	12	50	0.67
7	Symbiosis International (Deemed University), Pune, India	23	468	20.35	2	10	43.48	2.06
MOST IMPACTFUL ORGANISATIONS								
8	UPES Dehradun, India	18	457	25.39	2	9	50	2.57
9	Kasturba Medical College, Manipal, India	5	415	83.00	0	4	80	8.42
10	Manipal Institute of Technology, Manipal	5	346	69.20	0	4	80	7.02
11	North South University, Dhaka, Bangladesh	5	269	53.80	1	5	100	5.46
12	Lovely Professional University, Punjab, India	21	181	8.62	5	10	47.62	0.87
13	Vellore Institute of Technology, Vellore, India	22	128	5.82	6	11	50	0.59
14	KIIT Bhubaneswar, India	19	118	6.21	1	8	42.11	0.63

TP=Total Publication; TC=Total Citations; CPP=Citations Per Paper; FP=Funded papers; ICP=International Collaborative Papers; RCI=Relative Citation Index

Institutional Collaboration Network

Figure 5 presents the co-authorship network of the top 50 most productive institutions. Of the 1,729 organisations identified in the dataset, only those with a minimum of five publications and at least 20 citations were included in the analysis, resulting in 51 qualifying institutions. For visualisation and interpretive clarity, the top 50 were selected based on their TLS, which reflects the intensity of collaborative relationships. The resulting network comprised 16 distinct clusters interconnected by 128 collaboration links, with a combined TLS of 176, indicating a moderately connected research environment. The distribution of the clusters suggests varying degrees of institutional engagement. Clusters 1 and 2 emerged as the most prominent, each containing eight institutions and demonstrating strong internal and inter-institutional collaboration. Cluster 3 included six organisations, while Clusters 4 and 5 comprised five each, reflecting mid-level cooperative activities. Clusters 6 and 7, with three institutions each, represent smaller but cohesive research partnerships, whereas Clusters 8 to 10, containing two organisations each, depict more localised or bilateral collaborations. The remaining Clusters 11–16 represent single institutions, indicative of isolated research efforts with limited external linkages.

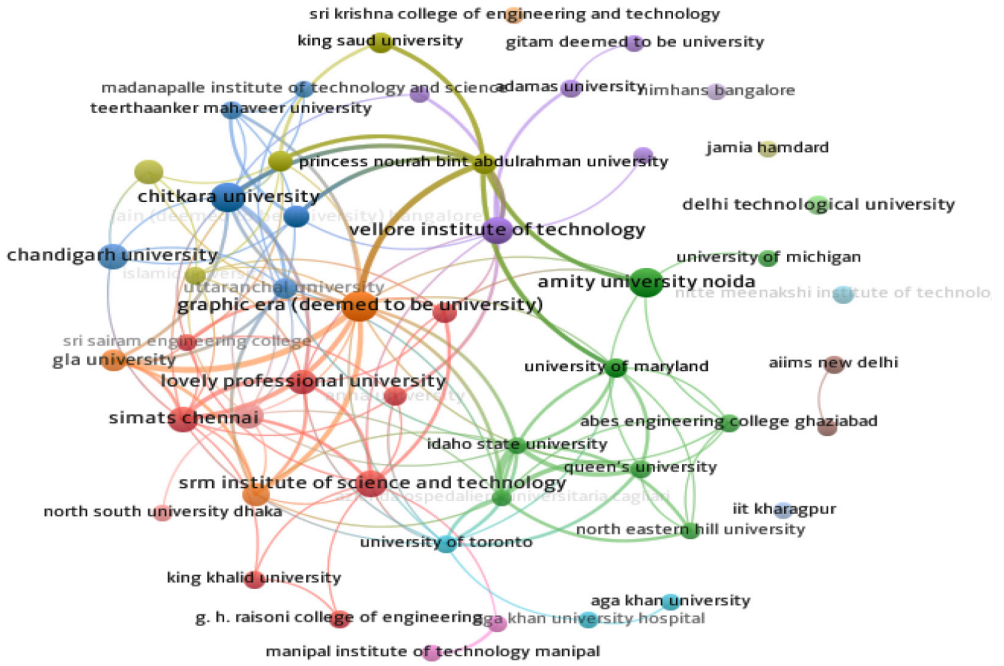

Figure 5

Collaboration Network of the top 50 affiliations

Most Productive and Impactful Journals

An analysis of the top 14 journals publishing research on AI applications in medical science revealed clear patterns in productivity and impact of AI. IEEE Access emerged as the most productive source, with seven publications, receiving 383 citations (CPP = 54.71; RCI = 5.55). It also demonstrated a high impact rate (ICP = 85.71%) and strong funding support (FP = 5), reflecting both the research volume and influence. Computers in Biology and Medicine recorded the highest citation performance among productive journals, with a CPP of 82.75 and an RCI of 8.39, despite publishing only four publications. Similarly, AI (Switzerland) achieved the highest RCI (8.47) with only two publications (CPP = 83.50), underscoring the strong scholarly reach of focused, high-quality research. Journals such as Cancers, Wireless Personal Communications, and Healthcare (Switzerland) also showed notable impact, each with CPPs of 67.00 and full international collaboration (ICP = 100%), indicating a positive relationship between cross-border partnerships and citation visibility. Conversely, the South-Eastern European Journal of Public Health (CPP = 0.25; RCI = 0.03) and Journal of the Pakistan Medical Association (CPP = 1.75; RCI = 0.18) showed minimal impact despite comparable publication counts (TP = 4), reflecting disparities in visibility and citation reach as shown in Table 6.

Table 6

List of the Top 14 Most Productive Journals

Sl. No.	Name of the Journal	TP	TC	CPP	FP	ICP	%ICP	RCI
MOST PRODUCTIVE JOURNALS								
1	IEEE Access	7	383	54.71	5	6	85.71	5.55
2	Computers in Biology and Medicine	4	331	82.75	3	3	75.00	8.39
3	Frontiers in Artificial Intelligence	4	113	28.25	1	3	75.00	2.86
4	Multimedia Tools and Applications	4	33	8.25	1	1	25.00	0.84
5	Asia Pacific Journal of Health Management	4	18	4.50	1	0	0.00	0.46
6	Journal of the Pakistan Medical Association	4	7	1.75	0	2	50.00	0.18
7	South Eastern European Journal of Public Health	4	1	0.25	0	0	0.00	0.03
MOST IMPACTFUL JOURNALS								
8	Cancers	3	201	67.00	1	3	100.00	6.79
9	AI (Switzerland)	2	167	83.50	0	1	50.00	8.47
10	Big Data and Cognitive Computing	3	145	48.33	0	3	100.00	4.90
11	Wireless Personal Communications	2	134	67.00	1	1	50.00	6.79
12	Sensors	3	132	44.00	3	3	100.00	4.46
13	Healthcare (Switzerland)	2	121	60.50	0	2	100.00	6.13
14	Sustainability (Switzerland)	2	111	55.50	2	2	100.00	5.63

TP=Total Publication; TC=Total Citations; CPP=Citations Per Paper; FP=Funded papers; ICP=International Collaborative Papers; RCI=Relative Citation Index

Analysis of Keywords with Occurrences

The analysis of keyword occurrences revealed a strong emphasis on the intersection of healthcare and advanced technologies. Artificial Intelligence (544 occurrences; TLS 1,311) and Machine Learning (258 occurrences; TLS 797) dominate the research landscape, underscoring their central role in transforming medical science. Keywords directly related to healthcare, such as Health Care (227 occurrences; TLS 738), Health Care Delivery (53), Mental Health (51), and Health Care Industry (34), further reflect the growing integration of AI technologies into healthcare systems and services. Emerging technologies such as blockchain (29), chatbots (24), and robotics (19) are gaining visibility, indicating their expanding role in shaping modern medical practices. The influence of the COVID-19 pandemic is also evident, with 48 related keywords, highlighting its impact on accelerating digital transformation in healthcare.

Data-focused terms, including Big Data (39), Data Privacy (18), Data Handling (17), and Data Analytics (14), emphasised the critical importance of ethical and effective data management in deploying AI and machine learning applications. As illustrated in Figure

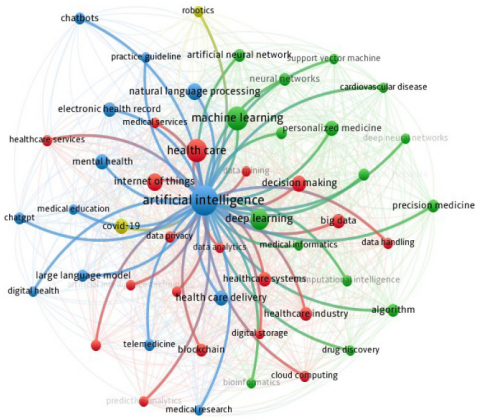

Figure 6 (A):

Network Visualisation of Co-occurrence of Top 50 Keywords (Software: VOSviewer)

Figure 6 (B):

WordCloud of 50 most frequent keywords (Software: Biblioshiny (R-studio))

6(A) through VOSviewer and Figure 6(B) via Biblioshiny, the findings indicate a clear convergence between healthcare and digital technologies. Together, these trends highlight AI and ML as key enablers of innovation, efficiency, and data-driven transformation in contemporary healthcare.

Most Influential Research Articles

Among the 1,020 papers analysed, 21 received 100 or more citations and were identified as HCPs. These 21 publications, appearing in 21 different journals and authored by 123 researchers, collectively accumulated 3,146 citations, averaging 149.81 CPP. The group comprised 11 review papers, six research articles, three conference papers, and one letter, with citation counts ranging from 100–334. Seven of these papers acknowledged funding support, reflecting selective financial backing for high-impact research in the field. International collaboration has played a central role in shaping research influence. Sixteen of the HCPs were internationally co-authored, evenly split between bilateral (8) and multilateral (8) collaborations. India contributed the majority of papers (14), followed by Pakistan (5), Bangladesh (2), and Afghanistan (1). The remaining five papers included four national collaborations and one produced by a single institution, indicating that while global cooperation enhances visibility and impact, some influential studies still emerge from independent research efforts. Figure 7 presents the co-occurrence network of these 21 HCPs, which formed 13 distinct thematic clusters. The node size reflects the TC, with larger nodes denoting a higher influence. The network contained 18 citation links, yielding a TLS of 24. This relatively modest TLS suggests limited cross-citation among the papers, implying that while each study is individually influential, they represent diverse and relatively independent research directions in the field.

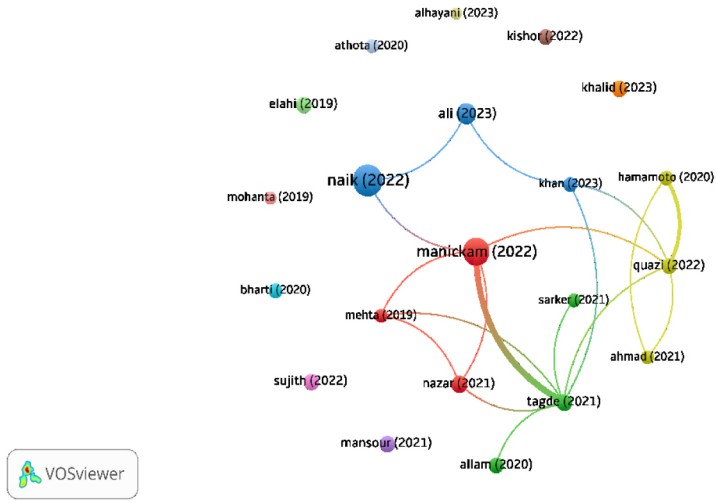

Figure 7

Network visualisation of the top 21 highly cited papers

Discussion

Between 2015 and 2024, AI research in medical science across South Asia demonstrated substantial quantitative growth, increasing from one publication in 2015 to 387 in 2024 based on an analysis of 1,020 papers. This expansion reflects increasing institutional engagement and the integration of digital technologies into healthcare. However, the average CPP declined from 28.75 in 2018 to 5.12 in 2024, indicating that rapid publication growth has not been accompanied by proportional increases in the research impact. Similar trends have been reported in other emerging regions, where expansion precedes the stabilisation of citation quality and international recognition. Research output was distributed across 19 subject areas, with medicine (35.0%), computer science (30.6%), and engineering (17.7%) being the most prominent. This interdisciplinary overlap underscores the growing integration of AI in diagnostics, imaging and healthcare informatics. Review papers constituted 30.8% of the total output, suggesting a strong emphasis on synthesising evidence and mapping knowledge. India accounted for nearly 80% of the TP (79.9%), followed by Pakistan (11.2%) and Bangladesh (4.0%), reaffirming India's leadership in the regional research landscape. International collaboration was evident in 40.6% of the total publications, predominantly involving the United States, the United Kingdom, and Saudi Arabia. Collaborative papers recorded higher average citations, reinforcing the established association between global partnerships and research visibility. The most productive journals, Frontiers in Public Health (TP = 45; TC = 713) and Cancers (TP = 32; TC = 689), demonstrated a clear preference for multidisciplinary outlets connecting computational approaches to clinical applications. Keyword analysis revealed the frequent co-occurrence

of "machine learning", "deep learning", "medical imaging", and "diagnosis", reflecting focused efforts toward predictive modelling and disease detection.

Among 1,729 contributing institutions, research productivity was highly uneven. Graphic Era (Deemed to be University), Dehradun (TP = 38), Amity University, Noida (TP = 30), and SRM Institute of Science and Technology (TP = 30) were the most prolific, while Kasturba Medical College, Manipal achieved the highest citation efficiency (CPP = 83.00; RCI = 8.42), indicating a substantial qualitative impact despite a lower output. Twenty-one highly cited papers (HCPs) collectively received 3,146 citations (average 149.81 CPP), with 76% resulting from international collaborations. India contributed 14 HCPs, underscoring its dominant position in advancing regional AI–medical research. The findings suggest that South Asia's AI–medical research is in a phase of rapid structural expansion, characterised by increased output, interdisciplinary diversification, and active collaboration, yet limited by uneven citation influence and institutional disparities. The observed patterns align with global trends, where early growth in publication volume precedes the consolidation of research quality. Strengthening cross-national collaboration, enhancing data standardisation, and promoting translational research are essential for advancing research quality and visibility in this field. Strategic investment in interdisciplinary integration and policy-driven support will be critical for South Asia to evolve from a region of rapid growth to a globally influential hub in AI-driven healthcare.

Conclusion and Future Perspectives

This review underscores the significant expansion of AI research in medical science across South Asia between 2015 and 2024, reflecting the region's growing commitment to integrating computational innovation with healthcare advancement. India remains the principal contributor in terms of research output and scholarly impact, while neighbouring countries such as Pakistan and Bangladesh exhibit notable citation performance despite lower publication volumes. The region's research trajectory demonstrates increasing interdisciplinarity and collaboration, particularly through international partnerships that enhance visibility and citation influence. However, the uneven distribution of impact across institutions and countries suggests that growth remains in a developmental phase, requiring sustained quality enhancement and research consolidation.

Future research must focus on strengthening institutional capacities, fostering transnational collaboration, and encouraging open-access data sharing to promote reproducibility and inclusivity in AI-driven healthcare. Greater emphasis should be placed on clinical validation, ethical frameworks, and contextual adaptation of AI models to address region-specific health challenges. Policy-level support for research funding, capacity building, and cross-sectoral integration will be crucial for South Asia to evolve from an emerging research hub to a globally recognised leader in AI-enabled medical science.

Disclosures

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None

Conflict of Interest

The authors declare no conflicts of interest.

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Ethical approval

Not required for such a bibliometric study

Data availability

The raw data is available from the corresponding Author

Credit Statement for Author's Contribution

GMM: Conceptualisation, data curation and analysis, literature search, manuscript writing, and editing.

AKS: Conceptualisation, Data Curation and Analysis, Manuscript writing, editing, and final approval.

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