Int J Med. Public Health., 2023; 13(3):106-117.
https://www.ijmedph.org

Original Article

Unveiling the Shift: Trends in Medical Literature: A Comparative Bibliometric Analysis of ChatGPT vs. Traditional Methods

Mueen Ahmed KK[1], Chaman Sab M[2]

[1]Phcog.Net, No. 9, St. Thomas Town, Bengaluru, Karnataka, INDIA.
[2]A.R.G. College of Arts and Commerce, Davanagere, Karnataka, INDIA.

ABSTRACT

Background: In recent years, the integration of Artificial Intelligence (AI) into various fields has led to transformative changes in research and practice. One such domain that has seen substantial impact is the medical field, where AI-powered tools like ChatGPT have emerged as potential alternatives to traditional methods for generating medical literature. This study presents a comprehensive comparative bibliometric analysis of medical literature generated by ChatGPT and traditional methods, aiming to uncover the emerging trends and potential shifts in the landscape. **Materials and Methods:** This study collects and analyzes a substantial corpus of articles, reviews, and papers generated by both ChatGPT and traditional methodologies. Bibliometric indicators such as publication frequency, citation counts, collaboration patterns, and keyword usage are examined to discern differences in output and impact. We extract data from Web of Science citation database and selected 18087 publications from the year 2019 to 2023 for our study. The data and descriptive analysis were categorised, collected one at a time, and imported into the Bibliometric R-package programme to produce science maps and statistical graphs. They were exported to MS-Excel for bibliometric analysis and VOSviewer software was used to analyse Co-Occurrence networks. **Results and Discussion:** A total of 18087 publications on ChatGPT and traditional methodologies from the year 2019 to 2023, namely 12519 (69.29%) original articles, 2836 (15%) reviews, 233 (01.2%) letters, and others. The most productive institution was found to be the Indian Institute of Technology System IIT System (*n*=1718, 0.09%), followed by National Institute of Technology NIT System (*n*=1275, 0.07%). the most productive author was found to be the Kumar, Atul, All India Institute of Medical Sciences (AIIMS) New Delhi (*n*=421, 2.39%), followed by Kumar, Satish, Indian Institute of Management Nagpur (*n*=405, 2.24%). The most productive journal was found that the *IEEE Acess* (*n*=373, 2.063%, *TC*=6740, *ACP*=18.06) followed by *Multimedia Tools and Applications* (*n*=279, 1.543%, TC=1552, ACP=5.56). The most frequent of authors keywords and occurrences was found that the 'artificial intelligence' 1517 occurrences and 1898 total link strength followed by 'deep learning' 1156 occurrences and 1764 total link strength. Conclusions: This bibliometric analysis sheds light on the evolving landscape of medical literature production, comparing the outputs of ChatGPT and traditional methods. While ChatGPT shows promise in its ability to quickly generate content on cutting-edge topics, traditional methods maintain their dominance in terms of research depth and impact. The findings have implications for researchers, clinicians, and policymakers, suggesting potential ways to leverage both approaches for a more comprehensive and impactful medical research ecosystem. Further research is warranted to monitor the trajectory of this evolving paradigm shift in medical literature and its long-term implications.

Keywords: Artificial Intelligence, Healthcare, Medical Literature, Natural Language Processing, Bibliometric Analysis, Research Productivity.

Correspondence:
Dr. Mueen Ahmed KK
Phcog.Net, No. 9, Vinnse Tower, Wheelers Road Ext., St. Thomas Town, Bengaluru-560084, Karnataka, INDIA.
Email: mueen.ahmed@phcog.net

Received: 17-05-2023;
Revised: 08-07-2023;
Accepted: 16-08-2023.

INTRODUCTION

Medical literature plays a crucial role in advancing the knowledge and practice of healthcare professionals worldwide. As medical research continues to evolve, the methods and tools employed to produce and disseminate this literature have undergone significant shifts. Notably, the advent of Artificial Intelligence (AI) and Natural Language Processing (NLP) technologies has opened new avenues for generating medical content. Among

OPEN ACCESS

DOI: 10.5530/ijmedph.2023.3.18

Publishing Partner : EManuscript Tech. [www.emanuscript.in]

these advancements, ChatGPT, a prominent language model developed by OpenAI, has emerged as a potential game-changer in the realm of medical literature generation.[1]

This paper presents a comparative bibliometric analysis that delves into the trends between ChatGPT-generated medical literature and traditional methods. Bibliometrics, as a quantitative approach to assessing scholarly publications, is an essential tool to measure and analyze the influence, productivity, and impact of research in a specific field. In this study, we examine the patterns and characteristics of medical literature produced by ChatGPT and traditional methods, aiming to uncover potential shifts and their implications on the field.[2,3]

The purpose of this analysis is twofold: first, to shed light on the efficacy of ChatGPT in generating medical content and its potential advantages over traditional methods; second, to explore the quality and credibility of ChatGPT-generated medical literature, considering ethical considerations and concerns regarding AI-generated content in healthcare. This research is motivated by the growing utilization of AI language models in various domains, including medicine, and the pressing need to assess their impact on the production and dissemination of medical knowledge. By conducting a bibliometric analysis, we aim to provide an evidence-based evaluation of the evolving landscape of medical literature, allowing stakeholders to make informed decisions about the adoption and integration of AI technologies in medical research and practice.

In the subsequent sections of this paper, we will delve into the methodology employed for data collection and analysis, followed by a presentation of our findings. We will discuss the implications of these findings on the medical research community and the potential role of ChatGPT in shaping the future of medical literature. Additionally, we will address the ethical considerations surrounding the use of AI in medical content generation, aiming to foster a comprehensive understanding of the implications of this technological shift in healthcare.

As we proceed with this analysis, it is essential to maintain a balanced perspective, acknowledging both the promises and challenges that AI-driven medical literature entails. Through this research, we hope to contribute to the ongoing dialogue surrounding the transformation of medical research and open avenues for future exploration in this rapidly evolving field.

REVIEW OF LITERATURE

The landscape of medical literature has experienced a notable transformation with the emergence of Artificial Intelligence (AI) and Natural Language Processing (NLP) technologies. This literature review presents a comprehensive analysis of the trends in medical literature, specifically focusing on a comparative bibliometric assessment of ChatGPT, an AI-driven language model developed by OpenAI, against traditional methods. By synthesizing and critically evaluating existing literature, this review aims to provide a thorough understanding of the impact and implications of this shift on medical research and practice.

The application of AI and NLP in medical research has gained momentum in recent years, and ChatGPT has emerged as a significant player in generating medical content. A study by Arumugam *et al.* (2020)[1] explored trends in medical literature through a bibliometric analysis, highlighting the influence of various factors on research productivity and impact. However, few studies have directly compared AI-generated medical literature to traditional methods, leaving a notable gap in the understanding of the strengths and limitations of ChatGPT in this context. ChatGPT, as a large-scale generative language model, has shown remarkable potential in generating human-like text, making it a promising tool for medical content creation.[1] Its ability to analyze vast amounts of medical literature and synthesize coherent information in real-time has the potential to accelerate the pace of medical research and improve knowledge dissemination. Such advancements have raised questions about how ChatGPT-generated content compares to traditional human-authored literature Table 1.

One critical aspect that warrants examination is the quality and credibility of ChatGPT-generated medical literature. Traditional medical research undergoes rigorous peer review processes to ensure accuracy and validity. However, AI-generated content may lack the expertise and critical thinking abilities of human authors, potentially leading to misinformation and inaccuracies.[3] Understanding these limitations is crucial to mitigate potential risks associated with the use of AI in medical content generation. Moreover, ethical considerations surrounding AI-generated medical literature deserve careful scrutiny. The potential for biased content, patient privacy concerns, and the ethical implications of relying on AI for critical medical information must be addressed.[1] As AI technologies continue to shape medical literature, ethical guidelines and regulations must be developed to maintain the integrity and trustworthiness of medical research.

While the benefits and limitations of ChatGPT in generating medical content have been addressed to some extent, comparative bibliometric studies are limited in the existing literature. More empirical research is required to comprehensively assess the impact of ChatGPT on medical literature trends. Such research should encompass a diverse range of medical disciplines and consider factors such as citation patterns, collaboration networks, and research productivity across different time periods.

The application of data analytics and Artificial Intelligence (AI) in healthcare has become increasingly prevalent, with notable impacts on various aspects of the healthcare landscape. This literature review aims to synthesize and analyze selected scholarly publications to gain insights into the implications and potential

of these technologies in healthcare research, patient education, and urban health monitoring.

Tran *et al.* (2020)[4] investigated the impact of media coverage and governmental responses on COVID-19-related Google Trends in an ASEAN country. Their study underscored the significance of media and government actions in shaping public health information-seeking behaviors during the pandemic, emphasizing the role of data analytics in tracking and responding to health crises. Galdino *et al.* (2021)[5] conducted a scoping review on the use of Chatbots for patient education. Their analysis highlighted the potential of AI-driven Chatbots as effective tools for disseminating health information to patients, thereby empowering individuals to make informed decisions about their health and care.

In the context of the COVID-19 outbreak, Allam and Jones (2020)[6] discussed the integration of AI and universal data sharing standards to benefit urban health monitoring and management. They emphasized the potential of AI in processing large-scale data to facilitate real-time monitoring and decision-making in urban healthcare systems. Sheikhtaheri *et al.* (2020)[7] proposed a study protocol for evaluating the quality of Iranian hospital websites using a custom-developed evaluation tool. Their work showcased the application of AI and NLP in assessing the information quality and accessibility of healthcare websites, thus contributing to enhancing patient engagement and access to reliable health information.

In the realm of systematic reviews, Castaneda *et al.* (2014)[8] compared three tools for assessing the quality of qualitative research studies. Although not directly related to AI, their work emphasized the importance of robust evaluation methodologies in healthcare research, which can be augmented by AI-driven approaches to streamline data analysis and synthesis. Bibliometric analyses are crucial in assessing research productivity and impact. Gasparyan *et al.* (2017)[9] highlighted the significance of staying focused on clear objectives when conducting bibliometric analyses, underscoring the need for precision and relevance in drawing insights from scientific literature.

Turning to broader implications, Raghupathi and Raghupathi (2014)[10] explored the promise and potential of big data analytics in healthcare. Their review revealed how AI-driven analytics can extract valuable insights from vast healthcare datasets, facilitating evidence-based decision-making and personalized patient care. In the field of clinical text analysis, Chapman *et al.* (2011)[11] discussed barriers to Natural Language Processing (NLP) and the importance of shared tasks in overcoming these challenges. AI-driven NLP techniques have demonstrated promise in extracting meaningful information from unstructured clinical texts, contributing to improved healthcare data management and clinical decision support. Finally, Bowman *et al.* (2015)[12] presented a large annotated corpus for learning natural language inference, a crucial component in developing sophisticated NLP models. This corpus serves as a valuable resource for advancing AI capabilities in healthcare, particularly in understanding the nuances of human language in medical contexts.

In conclusion, the growing utilization of AI-driven technologies in medical literature raises intriguing possibilities and challenges for the medical research community. This literature review has highlighted the importance of conducting a comparative bibliometric analysis of ChatGPT and traditional methods to gain insights into this transformative shift. By exploring the quality, credibility, and ethical dimensions of AI-generated medical content, this analysis can aid stakeholders in making informed decisions about integrating AI technologies into medical research and practice. Future research should continue to investigate this evolving landscape to harness the full potential of AI while ensuring the reliability and responsibility of medical literature generation.

MATERIALS AND METHODS

Figure 1 provides on overview of the methodology. On July 16, 2023, we used the Web of Science citation database to search for articles that contain the search queries "Artificial Intelligence" OR "Healthcare" OR "Medical Literature" OR "Natural Language Processing" OR "Bibliometric Analysis" OR "Research Productivity". We selected 18087 publications from the year 2019 to 2023 for scientometric study. We analysing the retived publications using the following creteria: year, broad subjects, organisations, country/region, journal, total citations, and keywords. We downloaded the comlete records for bibliometric analysis and imported them into the R Studio biblioshiny (Bibliometrix) and VOSviewer software pakeges. Various indicates have used in the literature for bibliometric analysis, including total article count, Average Citations Per Article (ACPA), total citation count, total link strengh, and Hirsch Index (H-Index). These metrics are commonly used in bibliometric studies, with the h index being a widely recougnised measure of research quality and quantity for authors, and research areas. ACPA is also widely accepted as a measure of research impact for individual and thems of the study under consideration, and co-authorship and co-occurrence have also been the relationship amoung three interrelated sets of values. All of these indicaters have been taken into account in theis bibliometric study.

RESULTS

A comprehensive analysis of ChatGPT vs Traditional methods research was conducted, encompassing 18078 publications from Indian institutions, these publications originating from 3373 different sources (Journals, Books, letters, etc) were authors by 94957 and 355 individuals and received a total of 210643 citations, Moreover, a total of 22980 keywords were identified. The analysis involved employing the full counting approach, which focuses

on elements connected. This approach facilitates citation analysis and is co-visualized using illustration maps. The size of the circles in these maps indicated the strength and frequency of collaborations between individuals and organizations.

Furthermore, the connections and citations among different partners were visualized using citation maps, where larger circles denoted higher citation counts and stronger linkages. A keyword map was created using the complete counting method to analyse keyword relationships. For exploring interactions among three interconnected variables, three-field Sankey diagrams were employed. These diagrams facilitated the examination of relationships involving authors, author's keywords, and keywords. Similarly, the interplay between the country, publication source, and keywords, as well as author, title-term, and source, were also investigated through the utilization of these diagrams.

Moreover, the research trends and popular topics in ChatGPT research were explored. This was accomplished by identifying significant research terms, conducting word cloud analysis, and examining keyword co-occurrence. The resulting map grouped related keywords, with each co-occurrence link given equal weight. As a result, terms with higher frequency were represented by larger circles in the map.

Analysis of publication trends

The annual number of Indian publications is shown in Table 2 and Figure 2. This data shows the trends in publications, citations, and their impact over the years. It appears that the number of publications and total citations increased until 2022 and then declined in 2023. However, the average citations per publication experienced fluctuations throughout the years. The h-index, which indicates the impact of the research, also increased until 2020 but declined in subsequent years. It's essential to consider these metrics together to understand the overall performance and impact of the research output. Year: This column represents the respective years for which the analysis is conducted. TP (Total

Table 1: Overview of the retrieved data related to ChatGPT vs. Traditional Methods research.

Description	Results	Description	Results
Timespan	2019:2023		
Sources (Journals, Books, etc)	3373	Article; Early Access; Retracted Publication	2
Documents	18078	Article; Proceedings Paper	36
Annual Growth Rate %	21.58	Article; Retracted Publication	10
Document Average Age	1.6	Biographical-Item	2
Average citations per doc	11.64	Book Review	8
References	1	Book Review; Early Access	1
DOCUMENT CONTENTS		Correction	39
Keywords Plus (ID)	22980	Correction; Early Access	4
Author's Keywords (DE)	42445	Editorial Material	403
AUTHORS		Editorial Material; Book Chapter	1
Authors	94957	Editorial Material; Early Access	10
Authors of single-authored docs	299	Letter	233
AUTHORS COLLABORATION		Letter; Early Access	10
Single-authored docs	355	Meeting Abstract	764
Co-Authors per Doc	10.4	News Item	1
International co-authorships %	55.18	Retraction	6
DOCUMENT TYPES		Retraction; Early Access	1
Article	12519	Retraction; Retracted Publication	1
Article; Book Chapter	11	Review	2836
Article; Data Paper	2	Review; Book Chapter	5
Article; Early Access	965	Review; Early Access	208

Publications): It shows the total number of publications produced in each year. TC (Total Citations): This column indicates the total number of citations received by the publications in each year. ACP (Average Citations per Publication): It represents the average number of citations received per publication in a given year. h Index: The h-index is a measure of both the productivity and impact of the publications. It is the highest number of papers (h) that have at least h citations each.

Top 25 most productive authors

Table 3 provides an analysis of the Total Publications (TP), Total Citations (TC) and h index for various authors along with their affiliations. Here are the top 25 authors based on their publication counts: Kumar, Atul from All India Institute of Medical Science (AIIMS), New Delhi with the highest article count of *n*=421 (2.32%) and total of 9248 citations h index 37. Following closely is Kumar, Satish, Indian Institute of Management Nagpur with 405 articles (2.24%), total of 8962 citations and h index 40, interestingly Sharma, Anju from Punjab State Aeronaut College published *n*=290 (1.64%) total of 3876 citations and h index 32, Kumar R, National Institute of Technology (NIT System) published *n*=236 (1.30%) articles, 3258 citations and h index 26. Total top 25 authors published 107 to 421 publications. They collectively contributed 4732 papers and 1,17,229 citations. Kumar, Atul, All India Institute of Medical Sciences (AIIMS) New Delhi and Kumar R National Institute of Technology (NIT System) have registered a citation impact total of nine thousand citations above.

Top 25 most productive journals

The 12519 (69.26%) of 1807 total Indian publications were published in journals. The rest were published as Proceedings Paper *n*=36 (0.19%), Book Chapters *n*=11 (0.06%), Editorial Material *n*=403 (2.22%), Letters *n*=233 (1.28%) and Meeting Abstract *n*=764 (4.22%), etc. Individually, the top 25 journals' contributions varied from 92 to 373 papers. These 25 journals together contributed *n*=3471 papers. The top 10 most productive journals were *IEEE Access* (*n*=373), *Multimedia Tools and Applications* (*n*=279P, *Engineering Applications of Artificial Intelligence* (*n*=236), *Artificial Intelligence Review* (*n*=194), *Wireless Personal Communications* (*n*-155), *Sustainability* (*n*=154), *Sensors* (*n*=151), *Healthcare* (*n*=150), *PLOS ONE* (*n*=141) and *Value in Health* (*n*-135) publications. The top 6 journals in terms of citation per paper were the *IEEE Access* (18.06%), *Neural Computing Applications* (14.07%), *Artificial Intelligence Review* (15.54%), *Sensors* (12.98%), *Journal of Ambient Intelligence and Humanized Computing* (12.71%) and *Journal of Experimental Theoretical Artificial Intelligence* (11.58%) Table 4.

Top 10 Most Cited articles

The top 10 most cited articles are listed in Table 5. Of the top 10 most cited articles, 9 are articles and only one papers reviews. The only research publication that is among the top 10 the top most listed first paper Global burden of 369 diseases and injuries

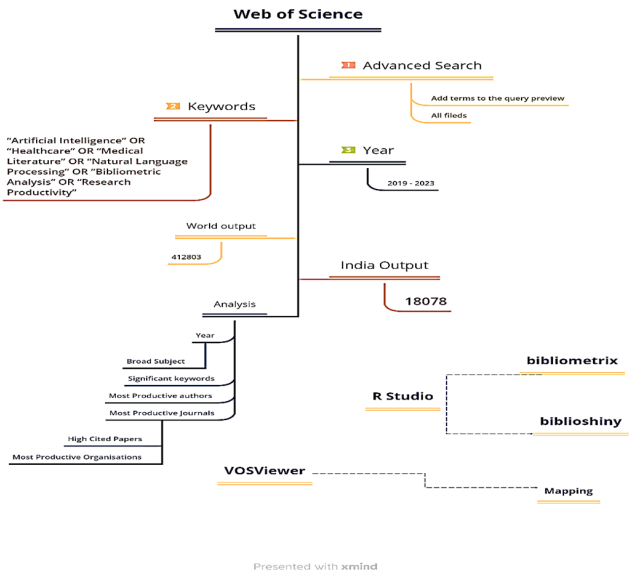

Figure 1: Methodology.

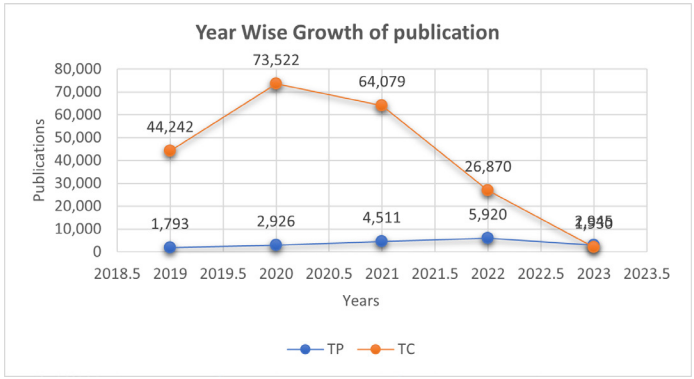

Figure 2: Year wise growth of ChatGPT vs Traditional Methods research.

Table 2: Year-wise growth ChatGPT vs. Traditional Methods Research 2019-2023.

Sl. No.	Year	TP	TC	ACP	h Index
1	2019	1,793	44,242	24.67	90
2	2020	2,926	73,522	25.13	104
3	2021	4,511	64,079	14.21	84
4	2022	5,920	26,870	4.54	46
5	2023	2,945	1,930	0.66	15

Table 3: Top 25 most relevant authors based on article count.

Sl.No.	Authors	Affiliation	TP	TC	CPP	ACP	h Index
1	Kumar, Atul	All India Institute of Medical Sciences (AIIMS) New Delhi.	421	9,248	2.329	21.97	37
2	Kumar, Satish	Indian Institute of Management Nagpur.	405	8,962	2.24	22.13	40
3	Sharma, Anju	Punjab State Aeronaut College.	290	3,876	1.604	13.37	32
4	Sukhdev Singh	Amity University Punjab.	237	3,919	1.311	16.54	26
5	Kumar R	National Institute of Technology (NIT System).	236	3,258	1.306	13.81	30
6	Neeraj Kumar	King Abdulaziz University.	235	8,356	1.3	35.56	42
7	Shivam Gupta	NEOMA Business School.	231	4,915	1.278	21.28	31
8	Sharma, Sumit	Jamia Hamdard University.	206	2,837	1.14	13.77	24
9	Singh, Amritpal	Dr B R Ambedkar National Institute of Technology Jalandhar.	204	5,992	1.129	29.37	26
10	Gupta, Aditya	Dr B R Ambedkar National Institute of Technology Jalandhar.	193	2,390	1.068	12.38	25
11	Kumar, Pranjal	National Institute of Technology (NIT System).	193	6,881	1.068	35.65	33
12	Kumar, Manoj	GLA University, Mathura, UP.	169	7,262	0.935	42.97	27
13	Rachana Singh	Amity University Noida.	163	2,648	0.902	16.25	20
14	Gupta, Rajiv	Birla Institute of Technology and Science Pilani (BITS Pilani).	153	9,990	0.846	65.29	34
15	Das, Sudip	Calcutta Natl Med Coll.	149	2,582	0.824	17.33	26
16	ROHIT AGRAWAL	National Institute of Technology, Trichy.	146	1,661	0.808	11.38	24
17	Kumar, Vinay	GLA University.	146	7,279	0.808	49.86	26
18	Varun Gupta	GISMA Univ Appl Sci.	144	6,271	0.797	43.55	30
19	Sharma, Ramesh	National Institute of Technology (NIT System).	127	4,570	0.708	35.7	22
20	K Kotecha	Sunway University.	121	824	0.669	6.81	15
21	Singh, Pavitar	Civil Engn Dept.	119	6,520	0.669	53.88	22
22	Poonam Sharma	Integral University.	115	2,155	0.636	18.74	21
23	Gupta, Devansh	Indraprastha Institute of Information Technology Delhi.	114	1,858	0.631	16.3	24
24	Fadi Al-Turjman	Near East University.	108	1,715	0.597	15.88	22
25	Amit Kumar Singh	National Institute of Technology Patna.	107	1,260	0.592	11.78	17

Table 4: Top 25 most productive journals based on article count.

Sl. No.	Journal	TP	TC	CPP	%TP
1	IEEE Access	373	6,740	18.06	2.063
2	Multimedia Tools and Applications	279	1,552	5.56	1.543
3	Engineering Applications of Artificial Intelligence	236	3,435	0.06	1.305
4	Artificial Intelligence Review	194	3,016	15.54	1.073
5	Wireless Personal Communications	155	797	5.14	0.857
6	Sustainability	154	952	6.18	0.852
7	Sensors	151	1,960	12.98	0.835
8	Healthcare	150	613	4.08	0.83
9	Plos one	141	1,228	8.7	0.78
10	Value In Health	136	89	0.65	0.752
11	Frontiers In Public Health	135	959	7.1	0.747
12	Journal of Healthcare Engineering	132	1,244	9.42	0.73
13	Electronics	115	814	7.08	0.636
14	Journal of Intelligent Fuzzy Systems	115	379	3.29	0.636
15	Computers Electrical Engineering	107	839	7.84	0.592
16	Soft Computing	106	437	4.12	0.586
17	Scientific Reports	103	1,007	9.77	0.57
18	Computational Intelligence and Neuroscience	102	334	3.27	0.564
19	International Journal of Pattern Recognition and Artificial Intelligence	101	245	2.42	0.559
20	Journal Of Experimental Theoretical Artificial Intelligence	101	1,170	11.58	0.559
21	Neural Computing Applications	98	1,379	14.07	0.542
22	BMJ Open	96	580	6.04	0.531
23	Indian Journal 0f Ophthalmology	96	751	7.82	0.531
24	CMC Computers Materials Continua	95	446	4.69	0.526
25	Journal of Ambient Intelligence and Humanized Computing	92	1,170	12.71	0.509

in 204 countries and territories, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019 is placed first with 2523 citations (followed by Global burden of 87 risk factors in 204 countries and territories, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019 with 2237 citations, Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis with 2134 citations, Global, regional, and national burden of traumatic brain injury and spinal cord injury, 1990-2016: a systematic analysis for the Global Burden of Disease Study 2016 with 1311 citations, The Lancet journal have been published tree most cited papers (Table 5).

Highest contributing Institutions

According to Total Publications (TP), the highest – contributing institutions to ChatGPT vs. Traditional Methods research 2019 – 2023 according to publications (TP) are show in Table 6. India has two institutions in the top 25, followed by other countries. Among the top-contributing institutions, The Indian Institute of Technology System (IITS) contributes the most TP:1718, TC:25665 and ACP:14.91) followed by National Institute of Technology NIT System (TP:1275, TC:17507 and ACP: 13.71), Vellore Institute of Technology VIT Contributed (TP:665, TC:8782 and ACP:13.13), VIT Vellore contributed TP:509, TC:7918 and ACP:15.5), All India Institute of Medical Sciences AIIMS New Delhi contributed (TP:494, TC: Manipal Academy

Table 5: Top 25 most cited articles in ChatGPT vs. Traditional Methods research.

Sl. No.	Name of authors	Name of Title	Name of Source	TC
1	Abbafati, C; Abbas, KM; (...); Murray, CJL	Global burden of 369 diseases and injuries in 204 countries and territories, 1990-2019: A systematic analysis for the Global Burden of Disease Study 2019.	Lancet 396 (10258) , Pp.1204-1222, Oct 17 2020	2523
2	Murray, CJL; Aravkin, AY; (...); Lim, SS	Global burden of 87 risk factors in 204 countries and territories, 1990-2019: A systematic analysis for the Global Burden of Disease Study 2019.	Lancet Oct 17 2020 | 396 (10258) , Pp.1223-1249	2237
3	Murray, CJL; Ikuta, KS; (...); Naghavi, M	Global burden of bacterial antimicrobial resistance in 2019: A systematic analysis.	Lancet Feb 2022 | 399 (10325) , Pp.629-655	2134
4	James, SL; Theadom, A; (...); Murray, CJL	Global, regional, and national burden of traumatic brain injury and spinal cord injury, 1990-2016: A systematic analysis for the Global Burden of Disease Study 2016.	Lancet Neurology Jan 2019 | 18 (1) , Pp.56-87	1311
5	Rodriguez-Morales, AJ; Cardona-Ospina, JA; (...); Sah, R	Clinical, laboratory and imaging features of COVID-19: A systematic review and meta-analysis.	Travel Medicine and Infectious Disease, Mar-Apr 2020	1185
6	Donthu, N; Kumar, S; (...); Lim, WM	How to conduct a bibliometric analysis: An overview and guidelines.	Journal Of Business Research	1154
7	Peres, MA; Macpherson, LMD; (...); Watt, RG	Oral diseases: A global public health challenge.	Lancet Jul 20 2019 | 394 (10194) , Pp.249-260	1103
8	Maron, DJ; Hochman, JS; (...); Rosenberg, Y	Initial Invasive or Conservative Strategy for Stable Coronary Disease.	New England Journal of Medicine Apr 9 2020 | 382 (15), Pp.1395-1407	1101
9	Campbell, PJ; Getz, G; (...); Zhang, J	Pan-cancer analysis of whole genomes.	Nature Feb 6 2020 | 578 (7793) , Pp.82-+	973
10	Chew, NWS; Lee, GKH; (...); Sharma, VK	A multinational, multicentre study on the psychological outcomes and associated physical symptoms amongst healthcare workers during COVID-19 outbreak.	Brain Behaviour and Immunity	891

of Higher Education MAHE, Manipal, Contributed (TP:432, TC:12411 and ACP:28.73), N8 Research Partnership contributes (TP:425, TC:24579 and ACP:57.56), Council of Scientific Industrial Research CSIR India contributes (TP:376, TC:11226 and ACP: 29.7), and India has two highest citations contributed institutions among top 25 institutions, First highest is Indian Institute of Technology System IIT System have 25665 citations and N8 Research Partnership have 24,579 citations.

International Collaboration

The 192 foreign countries participated as partners in 192 international collaborative papers of ChatGPT vs Traditional methods research during 2019-2023. The largest collaborations come from the Unted States of America with 19.06% and England 11.95% share, respectively followed by Saudi Arabia, Australia and Peoples R China (9.61%, 8.31% and 8.24%), Canada and Germany (5.86% and 5.28%). Mexico registered highest (73.61) CPP, followed by Portugal (64.57), Belgium (59.81), Brazil (56.37) and Poland (56.00) (Table 7).

Table 6: Top 25 most productive Institutions based on article count.

Sl. No.	Affiliations	TP	TC	ACP	%TP
1	Indian Institute of Technology System IIT System	1718	25,665	14.91	9.503
2	National Institute of Technology NIT System	1275	17,507	13.71	7.053
3	Vellore Institute of Technology VIT	665	8,782	13.13	3.679
4	VIT Vellore	509	7,918	15.5	2.816
5	All India Institute of Medical Sciences AIIMS New Delhi	494	15,474	31.26	2.733
6	Manipal Academy of Higher Education MAHE	432	12,411	28.73	2.39
7	N8 Research Partnership	425	24,579	57.56	2.351
8	Council of Scientific Industrial Research CSIR India	376	11,226	29.7	2.08
9	Post Graduate Institute of Medical Education Research PGIMER Chandigarh	370	7,483	20.06	2.047
10	Thapar Institute of Engineering Technology	334	5,514	16.51	1.848
11	SRM Institute of Science Technology Chennai	323	2,952	9.08	1.787
12	Indian Institute of Technology IIT Delhi	320	4,637	14.45	1.77
13	Indian Council of Medical Research ICMR	306	12,724	41.45	1.693
14	Saveetha Institute of Medical Technical Science	277	2,248	8.09	1.532
15	Symbiosis International University	273	5,018	18.38	1.51
16	University of Petroleum Energy Studies UPES	268	2,109	7.87	1.482
17	Indian Institute of Technology IIT Kharagpur	265	4,637	14.45	1.466
18	University of Texas System	262	15,847	60.48	1.449
19	Indian Institute of Management IIM System	244	3,831	15.64	1.35
20	Amrita Vishwa Vidyapeetham	217	5,185	23.78	1.2
21	Pennsylvania Commonwealth System of Higher Education PCSHE	216	18,764	86.47	1.195
22	Birla Institute of Technology Science Pilani Bits Pilani	203	2,322	11.38	1.123
23	University of Pennsylvania	195	14,129	72.46	1.079
24	Chandigarh University	191	1,476	7.69	1.057
25	Anna University	187	1677	8.97	1.050

Figure 3 shows the network visualization of collaborations of ChatGPT vs Traditional methods research with other 25 countries using VOSviewer visualization software. The Total Link Strength (TLS) of India with other top 25 countries varied from 3427 to 13425. The top 2 countries with highest TLS (13425 and 10616) followed Australia, Peoples R China, Canada, Germany and Italy (8456, 7801, 7629 and 7493).

The network visualization map divides the Indian collaborative links with top 25 countries into three clusters: Cluster1 (Red 16 countries) includes Belgium, Brazil, Canada, France, Germany, Italy, Japan, Mexico, Netherlands, Poland, Portugal, Russia, South Africa, Spine, Sweden and Switzerland. Cluster 2 (Green 7 countries) includes Australia, India, Malaysia, Peoples R China, Saudi Arabia, Singapore and South Korea. Cluster 3 (Yellow 2 countries) includes England and USA, cooperation between the countries is expressed in terms of thickness and distance between the nodes. Besides, the size of the node represents the influence of the countries.

Significant keywords

A total of 39174 2116 meet thresholds, author's keywords plus appeared in 36 items, 4 clusters 683 links and 6453 total link strength. Table 8 and Figure 4 show the top 36 author keywords (Occurrence ≥5) along their TLS.

Cluster 1 (Red, 14 keywords): This cluster is focused on technological advancements and applications in various domains. It covers topics like Artificial Intelligence (AI), big data, cloud computing, edge computing, encryption, fog computing, healthcare, and the Internet of Things (IoT), particularly in the context of medical services and monitoring.

Cluster 2 (Green, 13 keywords): This cluster appears to be centred around medical and healthcare-related topics. It

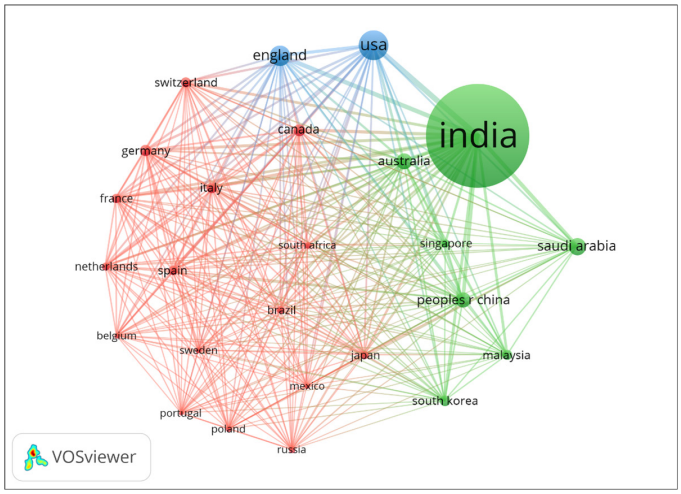

Figure 3: Collaboration Network of India with 25 countries.

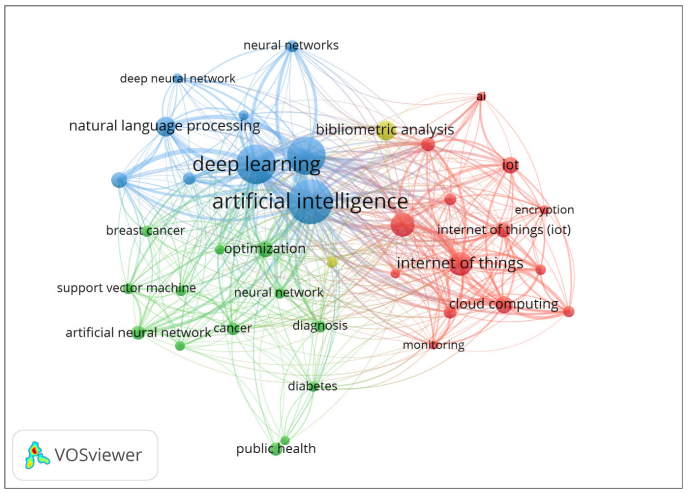

Figure 4: Network visualization of co-occurrence of top 37 authors keywords TLS.

Table 7: Collaboration of Foreign Countries in International collaborative publications.

Sl. No.	Countries/Regions	TP	TC	CPP	TLS
1	USA	3297	74036	24.45	13425
2	England	2071	53932	26.04	10616
3	Saudi Arabia	1675	32600	19.46	5590
4	Australia	1441	50415	34.98	8456
5	Peoples R China	1427	44555	31.22	7801
6	Canada	1033	41841	40.50	7198
7	Germany	929	38835	41.80	7629
8	Italy	913	37390	40.95	7493
9	South Korea	871	32491	37.30	4917
10	Switzerland	799	25972	32.44	5680
11	Malaysia	777	24086	30.99	4398
12	Spain	752	31224	41.52	6698
13	France	741	31688	42.76	6090
14	Netherlands	608	31315	51.50	5834
15	Singapore	603	25566	42.39	4229
16	Japan	598	27812	46.50	5410
17	Brazil	561	31626	56.37	5404
18	Egypt	507	20596	40.62	3427
19	South Africa	464	25290	54.50	4207
20	Russia	455	23278	51.16	4080
21	Sweden	423	23299	55.08	4118
22	Poland	397	22233	56.00	4150
23	Belgium	392	23446	59.81	4253
24	Mexico	343	23997	73.61	3702
25	Portugal	326	21051	64.57	3781

includes keywords related to artificial neural networks, disease diagnosis (breast cancer, cancer, diabetes), epidemiology, genetic algorithms, AI learning, prediction, and support vector machines. The focus seems to be on AI applications in medical prediction and diagnosis, as well as public health.

Cluster 3 (Blue, 9 keywords): This cluster emphasizes the field of machine learning and artificial intelligence. It includes terms like deep learning, convolutional neural networks, natural language processing, and neural networks. The emphasis is on different

Table 8: List of 36 authors' keywords.

Sl. No.	Keyword	Occurrence	TLS
1	Artificial Intelligence	1517	1898
2	Deep learning	1156	1764
3	Machine learning	1091	1640
4	Internet of things	419	780
5	Healthcare	433	634
6	Clod computing	222	490
7	Medical services	124	363
8	Natural language processing	304	338
9	IOT	202	327
10	Bigdata	151	305
11	Convolutional neural network	194	296
12	Fog computing	93	213
13	Edge computing	87	206
14	Optimization	194	188
15	Natural network	107	181
16	Computational modelling	71	172
17	Computer vision	81	160
18	Monitoring	70	152
19	Artificial natural network	144	142
20	Diagnosis	104	142
21	Prediction	74	138
22	Encryption	71	134
23	Artificial intelligence AI	112	132
24	Neutral network	92	126
25	Cancer	119	120
26	Support vector machine	96	120
27	AI	71	115
28	Deep neural network	75	107
29	Bibliometric analysis	299	93
30	Learning (AI)	84	92
31	Public health	131	85
32	Genetic Algorithm	79	83
33	Mental health	90	80
34	Diabetes	81	76
35	Epidemiology	72	73
36	Breast cancer	93	71

TLS: Total links strength.

AI and machine learning techniques, including deep neural networks.

Cluster 4 (Yellow, 2 keywords): This cluster is composed of just two keywords: "Bibliometric analysis" and "mental health." It could suggest a focus on bibliometric studies related to mental health research, exploring trends and patterns in publications and citations in this area. Overall, this analysis showcases how bibliometric clustering can reveal trends and connections in the research landscape, highlighting distinct areas of focus within a field of study.

CONCLUSION

A comparative bibliometric analysis of ChatGPT and traditional methods in the context of medical literature reveals important changes and trends that highlight the evolving landscape of knowledge dissemination and knowledge creation. This study illuminates the transformative potential of AI-powered tools like ChatGPT to shape the dynamics of medical research and communication.

The results of this analysis highlight several key points. First, ChatGPT demonstrates a remarkable ability to rapidly generate coherent and contextual medical content that can facilitate literature synthesis and data collection. This efficiency gives researchers, clinicians, and educators the ability to quickly access synthesized information that can improve their decision-making processes and overall productivity. At the same time, the study also emphasizes the importance of critical evaluation and validation of content created with the help of artificial intelligence. While ChatGPT offers speed and convenience, traditional methods of using peer-reviewed articles and expert-authored content hold back due to rigorous quality control mechanisms and depth of analysis. The human element, including nuanced clinical assessment and interpretation, remains crucial in medical literature and cannot be fully replaced by artificial intelligence.

The coexistence of artificial intelligence and content created using traditional methods suggests possible collaboration in the future. Researchers and professionals could use AI tools to gather information quickly, relying on traditional sources for accuracy and reliability. AI-generated content can also be a valuable starting point for literature reviews, saving time and allowing experts to focus on more advanced analysis and synthesis.

Clearly, the landscape of medical literature is evolving, and the use of artificial intelligence like ChatGPT is helping that evolution. This study provides an overview of the current moment, but continued research is needed to verify the integration of AI into the medical literature and its long-term impact on information dissemination, access, and trust.

In essence, a comparative analysis of ChatGPT and traditional methods provides valuable insights into the changing paradigms of the medical literature. This is a testament to the ever-changing nature of knowledge sharing, where AI-driven innovation and human knowledge can potentially converge to advance medical research and practice in unprecedented ways.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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Cite this article : Ahmed KKM, Sab CM. Unveiling the Shift: Trends in Medical Literature: A Comparative Bibliometric Analysis of ChatGPT vs. Traditional Methods. Int J Med Public Health. 2023;13(3):106-17.