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Growth of Medical Sciences Literature India for Last Decades: A Bibliometric Study

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Abstract: This paper will focus on the development of medical sciences literature in India during the past few decades, its history, institutions, technology, and qualitative aspects. The tradition of medical knowledge in India dates back to Vedic Ayurveda, the surgical innovations of Sushruta, the blossoming of the Unani school and Siddha school in Medieval India, the apex of which is the colonial era of introducing the formal Western medical education starting with Calcutta Medical College in 1835. The growth of medical colleges and research councils (like the ICMR) and funding agencies in the post-independence period created an infrastructure of an increasing scholarly output. Empirical support Bibliometric analyses have confirmed that India has registered 76.68 percent growth in medicine publication in 1999 - 2003 and 2004 2008 and in 2010- 2020 Indian compound annual growth rate is 9 percent in terms of increased publication, ranking it as the fastest growing research country in the world. The role of digitalization has been transformative, with the generation and dissemination of research and the generation and dissemination of bibliographic data streams, electronic health records, and national digital health missions continuing to increase in speed due to digitalization. India is currently at the second place in the world in terms of the publication on AI-in-healthcare, indicating a more profound penetration of the technology into its system of medical research. Nonetheless, major challenges continue to exist, such as a lack of research infrastructure in the majority of medical colleges or universities, a quality quantity mismatch, the churning out of predatory journals especially in the health sciences and a geographic concentration of high-impact production in a handful of institutional magn pockets. The future looks promising, though, unless continued investment, curriculum reform that encompasses research training, artificially intelligent analytic tools, and enhanced international cooperation are coupled by an actual cultural commitment to rigor, ethics-focused and societally engaging medical science. The paper supports strategic interventions that are required to convert the truly impressive quantitative development of India into the high quality and high-impact medical literature that has an impact all over the globe.

Keywords: *Medical Science, Literature Growth, India, Technology.*

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I. INTRODUCTION

The exponential expansion of the scientific literature in medical sciences is a phenomenon observed around the world that has manifested the developments in the research infrastructure, funding, and scholarly cooperation. Bibliometric analysis, a somewhat methodological approach to the quantitative assessment of scientific literature, is currently a valuable instrument to determine patterns, trends, and large contributions to a given area by using mathematical and statistical tools through bibliographic data, including publication record, citation measures, and authorship information retrieved in databases, such as PubMed, Scopus, Web of Science, and Google Scholar (Ganti et al., 2025). This method has many applications, such as identifying new trends in the published literature, analyzing the trends of collaboration, and describing the ascending scientific knowledge and the nuances of evolution of a certain field, providing the scholars with an opportunity to determine the gaps in research and locate new studies with the purpose (Kumar et al., 2023). The resulting quantitative mapping of the academic terrain has become irreplaceable by policymakers, funding agencies and academic institutions in gauging the performance of the national research and help these agencies foresee where the future lies.

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India being one of the most populous states in the world and a country struggling with a complicated disease burden had registered a stunning change in medical research production in the last few decades. India bears a triple impact of the diseases - disrupting communicable diseases, non-communicable diseases and developing new infections that have necessitated putting more capital and institutional involvement in medical sciences research (Gupta and Bala, 2011). Scientometric analysis evidence indicates that India was ranked number 12 among the productive nations in the field of medicine research with 65,745 papers and the global share of publication of 1.59 to refer to the number of papers published in the Scopus database with the specific years under 1990 - 2003 and 2004 - 2008 as growth rates (Gupta and Bala, 2011). Such a steep trend has since been gaining pace: the total research publication output in India across all fields has grown almost sixfold over the past ten and a half years, and has risen more than 195,000 in 2024 to 34,000 in 2010, becoming the second-fastest-growing country in total article count, with well over 72 percent of its output currently published

The development of Indian medical literature is not its own tale of mass only but also of its rising quality, cooperation and disciplinary spread. In the years 2010-2019 the total amount of publications in India increased by 9.46% Compound Annual Growth Rate (CAGR) against 5.62% worldwide with Medical and Health Sciences sectors steadily becoming one of the leading areas of publication in India. Certain medical areas have also proven to be extremely growing: a bibliometric analysis of Indian orthopaedic publications revealed that the number of publications increased steadily over the past 10 years, and the most recent year registered nearly four times the number of publications than in 2010, with New Delhi and Tamil Nadu becoming the most fruitful epicentres of publication activity (Karlapudi et al., 2022). The productivity in terms of the number of publications in Indian medicine research as demonstrated by the Web of science database of 2009-2018 has been growing exponentially within the past decade with the relative growth rate, doubling time and activity index all showing strong indications of a positive and accelerating research productivity (Patra and Bhattacharya, 2005). It is these trends that explain why case study analysis of the India medical literature should be done to provide evidence-based information on how to enhance the research ecosystem in the country.

A set of well-already established goals guides the current research to offer a thorough meaning of growth and nature of medical sciences literature in India during the past few decades. The research aim will be to check the annual trend in the growth of medical publications in India indexed in prominent bibliographic databases including Scopus, Web of Science, and PubMed, and to find the relative growth rate (RGR), doubling time (DT), and compound annual growth rate (CAGR) of the chosen literature set during the period of the research. It also intends to examine the patterns of authorship and the degree of collaboration, and collaborative coefficient in the Indian medical sciences research, and find out the most productive institutions, universities, and medical colleges that are contributing research output to the country. The research will also aim at analyzing the breakdown of publications in major medical sub-disciplines and subject areas and will also analyze the share of India in the world ranking and share of the medical sciences literature with regard to other major countries. The study is further postulated to assess the citation influence of the Indian medical publications based on the call of the h-index and mean citations per paper as well as determine the main journals both national and international through which Indian medical writing is widely published. Lastly, the research also seeks to mention the current shortcomings in the quality and scope of research, as well as to propose strategic options on how to enhance the role of India in the literature on the medical sciences in the world.

II. LITERATURE REVIEW

The conversation around the expansion of the literature in the medical sciences in India has been dominated by bibliometric and scientometric analyses that comprehensively measure and assess the output of the medical scientific literature, author productivity, networks of collaborations, and impact through citations. The seminal work in this space is the landmark study of (Bala & Gupta, 2012) which analysed the research output of India in medicine from the Scopus database for 1999-2008 and confirmed that India ranked 12 amongst productive countries in the field of medicine, with 65,745 papers to its credit, having a share in global publications at 1.59%, with the top 15 productive authors of India publishing 2,414 papers and having a group growth rate at 20.86% in the sub-periods of the study period of 5 years each, majorly from AIIMS New Delhi and National Institute of Immunohaematology, Mumbai. This initial assessment has been complemented by (Kumar et al., 2023), who presented the methods of medical bibliometric analysis, observing that the publications on bibliometric analysis have increased to over 1,000 publications annually in the past decade because of the growth in science and the access to large body of bibliometric data, making classical methods of assessment such as qualitative literature reviews and meta-analyses too complex and complementary to stand-alone operations (Patra & Bhattacharya, 2005). In another contextual analysis, (Gupta & Bala, 2018) confirmed using Web of Science data for 2009-2018 that India's medicine research grew exponentially during the decade with scientometric indicators such as relative growth rate, doubling time, activity index and international collaboration showing a steady, positive, accelerating trend in the 29,153 publications analysed (Sharma et al., 2018).

Studies focusing on the institutional level have shed more light on the nature and trends of India's medical literature. One key theme is focused on the All India Institutes of Medical Sciences (AIIMS), which collectively serve as the most visible and prolific medical research institutions. (Dhar & Patel, 2025) in their bibliometric study of the six new AIIMS institutions established through the Pradhan Mantri Swasthya Suraksha Yojana, reported that 7,133 documents have been published in the years 2013-2023 across the network with 2,531 documents published in 2021 as the

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highest and 110 in 2013 as the lowest, and while AIIMS Jodhpur has the highest rate of publication with 3,056 documents, AIIMS Patna has the highest rate of open access with 61.58%. From a comparative institutional standpoint, (Mukherjee et al, 2021) in their scientometric analysis of AIIMS and PGIMER, found that AIIMS published 20,550 articles in 2,382 distinct journals with 1,48,388 citations and PGIMER published 13,142 articles in 1,695 journals with 69,659 citations over the period 2000-2019, with stable upward trajectories in institutional output and increment in international collaboration (Bala & Gupta, 2011). At the sub-disciplinary level, (Parida & Nayak, 2023) pointed out that the establishment of new departments in AIIMS institutions alongwith the approved budget for dedicated research cells under the PMSSY initiative have been key among the factors accelerating the growth of research output in the AIIMS network, of which the UK and AIIMS New Delhi constitute the most prolific bilateral collaborators while ICMR is identified as the most prolific external research partner institution. (Gupta & Bala, 2011)

The international bibliometric work provides the theoretical and comparative context in terms of global context for India's medical literature growth. In a global comparative bibliometric analysis, (Sun et al., 2021) recently showed that the number of publications on bibliometric analyses globally grew from 51 in 2000 to 3,434 in 2022, with an exponential increase trend, $R^2 = 0.9375$, due to the growing focus on research performance evaluation, as well as significant improvements in database and computer technologies that allowed for the processing of a vast volume of literature (Karlapudi et al., 2022). With respect to India's patterns of international collaboration, (Arunachalam & Manorama, 2007) found using SCI data that categories of clinical medicine, physics and chemistry were among the top three in India's international collaboration output, with the USA, Italy, Germany, France and England as India's five major collaborating countries, a pattern that coincides with India's specialisation and increasing involvement in global medical research (Prasannakuma et al., 2025). Most recently, (Kumar, 2025) surveyed the evolution of bibliometric tools' technology, confirming that the emergence of bibliometric analysis is an essential technique in understanding the research landscape using statistical and quantitative methods, with tools such as VOSviewer, CiteSpace and Bibliometrix now facilitating advanced visualisation of collaboration networks, key-word co-occurrence and citation patterns across large data sets - tools that are increasingly being used by Indian medical researchers to analyse their own burgeoning literature (Karlapudi et al., 2022).

➢ *Objectives of the study*

- To analysis the chronological growth of medical science literature in India.
- To examine the role of digitalization and emerging technologies.
- Measure the growth rate of Indian medical science literature using bibliometric indicators such as annual growth rate, relative growth rate, doubling time.
- To suggest strategies measures for improving the quality, visibility and global impact of Indian medical sciences literature.

➢ *Scope and Limitation of the study*

The study limited to only the growth, impact and trends of medical science literature in India over the last few decades' .The analysis is based only secondary data from Scopus, web of science and Pub med.

III. METHODOLOGY

The present study adopts descriptive and bibliometric research design to analysis the growth of medical science literature in India over last few decades. For this study secondary data were collected from scopus, web of science and pub med using the keywords related to medical science. The data analysis using ms excel and VOSviewer software.

IV. RESULT & DISCUSSION

➢ *Trends in Medicinal Sciences Literature Growth*

The literature of medical sciences in India has experienced a spectacular growth in the past thirty years, that started as a small research foundation with an international outskirts'role, and evolved to be today among the most prolific publishers of scientific texts in the world. Scientometric analysis of the Indian research output in medicine by using Scopus Citation database has shown that India was ranked 12thin medicine research globally with a total output of 65,745 publications with a world share of 1.59% publication and a growth rate of 76.68% between 1999-2008 and 2004-2008 respectively (Gupta and Bala, 2011). This initial phase preconditioned the speedup that was observed in the decade afterwards. The total publications produced in India in 2010-2019 increased considerably, by 60,250 to 148,724 articles and a Compound Annual Growth Rate (CAGR) of 9.46% in total the world average being 5.62% indicating that Medical and Health Sciences was one of the most dominant subject areas in Indian publications (Kanaujja et al., 2023). With a 9 per cent compound average growth rate between 2010 and 2020, India has one of the highest growth rates of the 15 largest publication producers in the world, with China, Russia, Iran and Brazil following suit (White, 2021). These statistics affirm an obvious and consistent increasing pattern in the amount of medical literature produced in India that overwhelmingly surpasses most developed research economies.

There has also been growth in qualitative nature of the literature growth in medical sciences in India albeit with uneven distribution, experiences and among specialization, institutions and geographical areas. In absolute terms, China and India had been the two key contributors to the growth in the number of publications annually published in the world, accounting over half of any global increase in annual publications in the period, with India in itself making 11 per cent of all further publications (White, 2019). On the sub-disciplinary level, the trends in specialty-specific publication are also reflected: bibliometric analysis of the three largest orthopaedic journals of India included in PubMed, Scopus,

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and EMBASE in 2015-2020 revealed that JCOT had 1,158 articles, JOO had 1,070 articles, and IJO had 888 articles published (Patralekh et al., 2021). Likewise, bibliometric-related publications have increased exponentially annually around the world, increasing by a factor of four, rising from 51 in the year 2000 to 3,434 in 2022 ($R^2 = 0.9375$), in general, as scientists have been encouraged to increasingly focus on the quality of their research and as improved database technologies have made large-scale research of the literature more easily accessible (Cheng et al., 2024). The fact that this acceleration in bibliometric research in itself speaks of an increasingly growing scholarly awareness of the need to track and measure trends in publications in the Indian medical research community.

With such a notable level of quantitative growth, there have been substantial quality issues in the growth of Indian medical literature, most notably due to an increase in predatory publishing and uneven citation effects. Articles published in predatory journals have increased in the world by 53 000 in 2010 and around 420 000 in 2014 and health and medical sciences identified the largest number of predatory journals in India with 40 with pharmaceutical sciences ranked second with 38 articles published (Garanayak and Ramaiah, 2019). In India, the government funded repositories and platinum open access society journals have facilitated open access publishing, although it suffers severe challenges such as low quality and predatory open access journals and the lack of funds available to meet legitimate gold open access publications costs suggesting that more awareness be raised about publication practices by Indian academics (Misra and Agarwal, 2019). Over 2010-2022, the total publication output in health sciences has increased in all major countries, in total by 71 percent, and in health sciences per se by 66 percent, but India has experienced a relatively low ratio of the growth of quantity published to impact on citation, suggesting that the quantitative growth has not been linearly matched by the qualitative (Salager-Meyer, 2008). The key task of intermediate development of India as a member of world literature on medical sciences is to address this gap between the volume and quality (Kumar et al., 2023).

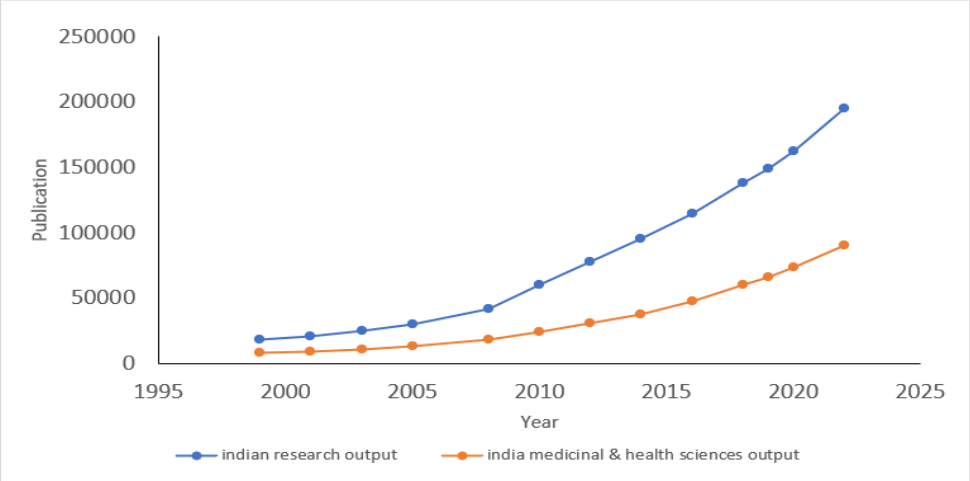

Fig 1: Trends in Medicinal Science Research Growth

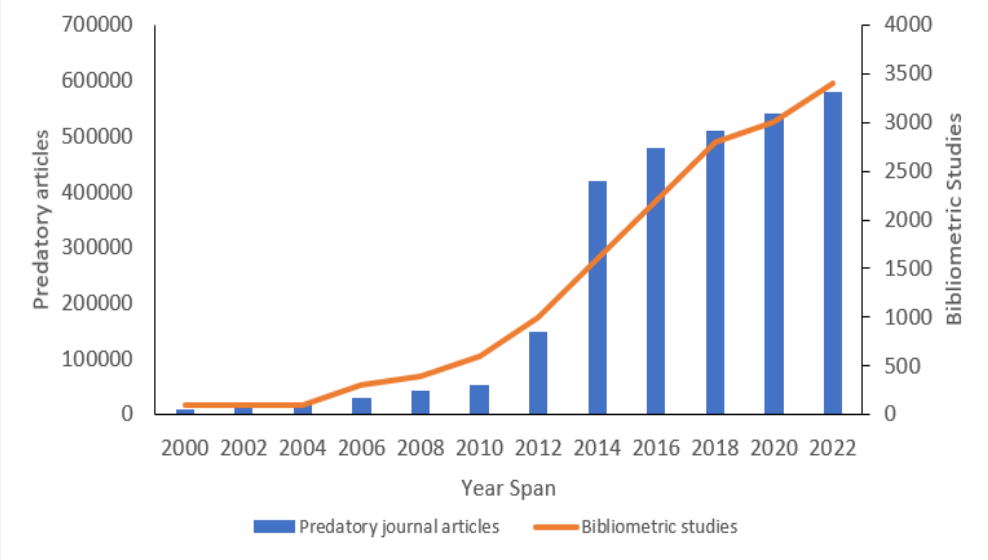

Fig 2: Predatory Journal Articles vs. Bibliometric Studies in Global Studies

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➢ *Role of Digitalization and Technology*

With the emergence of digital technologies, medical sciences literature in the whole world and India, in particular, have undergone a paradigm shift on the levels of its creation, distribution, and exploration. The eHealth described by the World Health Organization is the cost-efficient and safe use of information and communication technologies to facilitate domains connected to health, such as healthcare, health monitoring, health literacy, health research, health education, knowledge, and research the definition that explains the extent to which digital infrastructure has been integrated into the system of medical knowledge (Thacharodi et al., 2024). The advent of massive bibliographic search products like Scopus, Web of Science, PubMed, and Google Scholar has revolutionized the medical research community in India where vast access to resources in the world literature has now effectively been made available to them and the resultant output of their research can be systematically tracked. A systematic bibliographic review, searching Scopus, ScienceDirect and PubMed databases, between 2008 and 2021, helped identify 5,847 publications on digital transformation in healthcare to prove that wearable and information technologies, virtual reality, and the Internet of things remained very active in changing the landscape of healthcare operations all over the world, and India was not an exception (Stoumpos et al., 2023). This increase in open access publication has also reduced these barriers, enabling Indian scholars to read and write in internationally edited journals, directly contributing to the increase in the volume of medical literature written in India (Misra et al., 2020).

The national digital health programmes of India have been directly and quantitatively beneficial in catalyzing research and publication into medicine. In September 2021, the Ayushman Bharat Digital Mission (ABDM) was launched, a project to create a unified, effective, and inclusive national digital health ecosystem, with interoperable structures, open protocols and mechanisms of consent, to enable citizens, healthcare providers and digital innovators to collaboratively drive equitable digitization of healthcare nationally (Sharma et al., 2023). The ABDM was centered on a new 14-digit health identifier of all citizens the Ayushman Bharat Health Account based on the biometric infrastructure of Aadhaar allowing the safe authentication of health records and their management, and its COVID-19 acceleration created 130 million new accounts using the CoWIN platform and ensuring efficient maintaining of health records among the population (Narayan et al., 2024). These information-generating platforms have turned into vehicles of clinical research generating massive datasets that are used to drive epidemiology, public health, and health informatics publications. By 2027, the Indian digital health market is expected to reach US 25.64 billion with pivotal role played by telemedicine, e-pharmacy, online consultation as well as mobile health applications as it would represent a growth rate of around 20.4 per cent on a compounded annual basis, and the range of researches that can be conducted and published would also grow (Gopal et al., 2019). This institutional online ecosystem has left a green space to another boom of India-based medical literature on the topic of digital health outcomes and interventions.

The advent of artificial intelligence and machine learning as instruments both in medical practice and research has created a whole new field of medical literature, with India proving a significant contributor. An extensive bibliometric review of AI studies in the medical field in Scopus based database between 2013 and 2023 showed that the Indian subcontinent was ranked second in the world with 822 articles, next to the USA with 1,107 articles, but the number of publications both in AI and in healthcare was growing and developing exponentially between 2019 and 2023 (Senthil et al., 2024). A wider bibliometric search of AI and health information reports 1,083 scholarly papers published over 1993-2023 showed that the annual rate of increases in publication rose by an average of 13 per cent with the US, China, UK, Canada and India the most prominent in the collaborative studies and COVID-19, artificial intelligence and machine learning being the most prominent in the most recent publications (Aldousari and Kithinji, 2024). Through a 30-year bibliometric search of AI publications in healthcare, 22,950 papers were identified in the Web of Science in 1993-2023, demonstrating an exponential growth trend in the use of AI technologies in healthcare and an ever-evolving dynamism with new technologies like large language models and deep learning (Xie et al., 2025). In the case of India, digital health infrastructure, the capacity of AI research, and a rising number of trained researchers all tend to put the country in a better position to play an increasingly pivotal role in the world literature of medical sciences down the decades (Rana et al., 2024).

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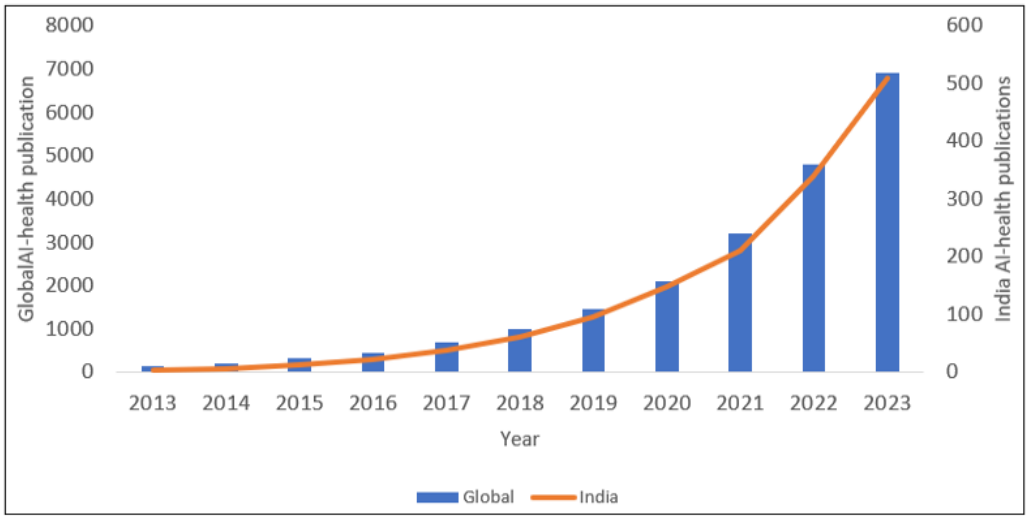

Fig 3: Global vs. Indian AI-healthcare publications (2013-2023)

V. CONCLUSION

One of the most spectacular changes in the academic community of the world is the development of literature in medical sciences in India during the past several decades. Since early Ayurvedic and Charaka and Sushruta Samhitas and later inclined by the influence of the colonial era institutional medicine, the India-relationship to medical knowledge production has continued to be dynamic historically and unevenly distributed. However, India has also become a quantitatively significant contributor to the world body of medical research in the modern era trial, as the 12th-ranked producer of indexed medical research publications in 19992008 has increased to the 3rd-ranked in 2015, with the compound annual growth rate of 9% between 20102020, many times higher than the overall growth One key impetus of this rise has been digitalization, where platforms like Scopus, PubMed, and Web of Science have allowed discoverability of an extent never previously seen, and national efforts like the Ayushman Bharat Digital Mission have built extremely large health data ecosystems, capable of delivering research with clinically and epidemiologically meaningful results. The fact that India is becoming the second-largest provider of AI-in-healthcare publications is also a positive indicator of a qualitative transformation of traditional biomedical research. Nevertheless, the lingering discrepancies between publication volume and citation impact, ubiquitous impact of predatory journals, infrastructural inequity across institutions and geographies, and the chronic underinvestment in basic and translational research are critical issues that manage to dampen optimism. The future of the medical sciences literature in India has always been based on the critical cultural and policy change - that of putting quality and ethical rigour, institutional fairness and proper responsiveness to the uniqueness and pressing disease burden of India on its agenda.

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