

Digital Transformation of Indian Healthcare: A Bibliometric Analysis Based on Telemedicine

Anusandhan-NDIM's Journal of Business and Management Research
Vol.6, Issue 2, August - 2024

<https://qtanalytics.in/journals/index.php/ANUSANDHAN>
<https://doi.org/10.56411/anusandhan.2024.v6i2.13-23>
<https://orcid.org/0009-0003-4714-7819>

Ms. Shweta

Research Scholar, Amity University, NOIDA

Abstract

India's healthcare system faces challenges due to a shortage of hospitals, doctors, and facilities. The integration of telemedicine into healthcare makes it possible to spread medical expertise to remote areas and improve access to health services. Thus, this study's objective is to ascertain and assess the scientific literature on telemedicine in the Indian context by conducting a bibliometric analysis to identify the publication's trends, important and trending keywords, authors, sources, and most cited publications. Another goal is to determine the conceptual, intellectual, and social structure of the relevant literature. This research conducts a bibliometric analysis of telemedicine literature in India using Scopus data from 2013 to 2022. Among the findings, Kumar A. stands out as the most prolific author, and the "All-India Institute of Medical Science" is the leading institution. The "Journal of Medical Systems" is the most influential source. Trending keywords in 2022 include psychiatry, technology, and attitude. Collaboratively, India and the USA published the highest number of articles. Our study provides a detailed overview of telemedicine advancements in India's healthcare sector, offering valuable insights for academics, policymakers, and practitioners. The findings validate telemedicine's progress in India's healthcare and suggest future studies expand to other countries.

Keywords: Telemedicine, India, Bibliometric analysis, Digital Healthcare

Introduction

India, with a population exceeding 1.3 billion people, stands as the second most populous country with limited human and economic natural resources. The WHO suggests maintaining a ratio of one doctor for every 1000 patients, but currently, India has a ratio of only 1 doctor per 11,082 patients (Gupta, 2018). It is anticipated that this ratio will be low for some time because the training and education of new physicians require time and money. Additionally, a significant number of healthcare facilities and doctors are concentrated in urban and town regions, serving just 31% of the total national population (Agarwal et al., 2020). As a result, equitable distribution of healthcare resources has emerged as an essential

objective in public health management.

Physical access to health services was restricted in India coupled with other challenges like insufficient healthcare personnel, uneven distribution, affordability issues, significant information gaps, and low health awareness (Kasthuri, 2018). Coronavirus has worsened the existing situation. Telemedicine serves as a valuable solution to address challenges and ensure ongoing patient care. This innovative tool extends healthcare services to distant locations and communities, connecting patients with doctors through electronic platforms for medical assistance and health education (Perednia & Allen, 1995). Telemedicine is an emerging service that seeks to give

access to reasonable and high-quality medical care, especially during the coronavirus outbreak (Kichloo et al., 2020). In 2001, ISRO initiated a significant step in advancing telemedicine in India through the launch of a Telemedicine Pilot Project in association with Apollo Hospital. Telemedicine in India provides numerous advantages, especially in overcoming healthcare system challenges. Key benefits are the enhanced accessibility of medical care for people in remote areas, ensuring prompt access to professional support and assistance. It streamlines the experience for both patients and healthcare providers, cutting down on patient traveling costs and efforts while minimizing travel time for medical staff (Haleem et al., 2021). Although telemedicine has many advantages, it also faces hurdles such as limited technology in some areas, security issues regarding patient data, and difficulties in executing standard medical examinations (Gajarawala & Pelkowski, (2021). While telemedicine has been intermittently employed within the Indian healthcare system until now, the outbreak has sparked a dramatic rise in telemedicine use in India, marking a transformative shift in healthcare delivery (Galagali et al., 2021). Thus, this study's present objective is to determine and assess the patterns and trends in telemedicine publication in India from 2013 to 2022 by considering the most productive authors, articles, organizations, important journals, keywords, and collaboration networks of India with other countries, authorship patterns, etc.

The study is divided into five sections in addition to this introduction. The second section describes the relevant telemedicine literature conducted in India. A

detailed explanation of the methodological processes is provided in the third part. The fourth segment displays the results of the data analysis. The main restrictions are then examined, along with suggestions for further research.

Literature Review

An overview of publications related to the use of telemedicine in India has been discussed in this section. With the start of COVID-19, most of the research articles were narrative in nature and discussed the telemedicine framework and the implementation issues (Dash et al., 2021; Dinakaran et al., 2021). Several research examined the application of telemedicine for patient care in various clinical disciplines, including neurology, dermatology, childcare, dentistry, psychiatry, abortion, diabetes, ophthalmology, ICU services, rehabilitation etc (Venkataraman et al., 2024).

Furthermore, several reviews have highlighted the benefits and barriers associated with the adoption of telemedicine in India such as (Rajkumar et al., 2023) have mentioned that telemedicine provides various advantages like patient-provider satisfaction, cost-effectiveness, easy accessibility, instant medical advice, convenient initial and follow-up care, bridging the urban-rural divide, and making healthcare more accessible to all. However, its widespread adoption is hindered by various challenges such as insufficient medical and technological infrastructure, lack of experts, lack of physical examination, technological illiteracy, data security and privacy, legal concerns, and limited patient-provider relationships. Additionally, several obstacles such as confidentiality, privacy, data accuracy, medical

liability, cases of misdiagnoses fraud and abuse, complexity, and controlled substances prevent the effective use of telemedicine in India (Haleem et al., 2021). To overcome these barriers and promote the growth of telemedicine, (Dash et al., 2021) recommended expanding and improving telemedicine guidelines, strengthening the legal framework and technological infrastructure, and providing comprehensive training to the practitioner. In addition, (Aneja & Arora, 2021) have also highlighted some ethical issues related to telemedicine in India and provided possible solutions.

The Indian government has also been supporting telemedicine adoption by publishing telemedicine guidelines, developing digital healthcare infrastructure, and launching e-SanjeeviniOPD which offers free care from public doctors and taking several initiatives with the help of various ministries including the Ministry of Electronic & Information Technology, NITI Aayog, MoHFW, National Digital Health Mission (Sikka, 2022).

The available literature on telemedicine is fragmented in various contexts and existing research has shown that various review articles have examined the current state and future potential of telemedicine (Chandwani & Dwivedi, 2015; Kaeley et al., 2021; Kappal et al., 2014; Mishra et al., 2009, 2011). However, existing literature on telemedicine lacks a comprehensive bibliometric analysis in the Indian context. Bibliometric analysis is an advanced tool to synthesize the existing literature scientifically (Donthu et al., 2022; Suban et al., 2021). Thus, our study aims to fill this gap by conducting a bibliometric analysis, providing valuable insights into this field, and

offering a comprehensive overview of research trends and areas for further exploration.

Methodology

The Scopus database was used to extract articles by using the keyword "Telemedicine". The initial search yielded 62,134 documents. The initial findings were further reduced by excluding press publications, book chapters, Conference proceedings, review papers, and articles in languages other than English. Our study is limited to journal papers published between 2013 to 2022. After evaluating and applying specific criteria for inclusion and exclusion, a total of 1196 research papers were used for the final analysis. The study was performed using an open-source program known as the bibliometric R-package.

Data Analysis

In this section, we conducted a thorough examination of bibliometric studies, identifying 1196 unique records currently utilized in research. Table 1 contains the descriptive information of the documents.

Table 1: Descriptive Information	
Timespan	2013:2022
Journals	559
Research articles	1196
Document Average Age	3.09
Annual Growth Rate %	17.65
Average citations per doc	13.04
References	34758
Keywords Plus (ID)	6391
Author's Keywords (DE)	3171
Authors	4799
Authors of single-authored docs	53
Single-authored docs	61
Co-Authors per Doc	5.49
International co-authorships %	30.27

Publication Pattern on Telemedicine in India

Figure 1 depicts research publication trends in telemedicine from 2013 to 2022, reveal a remarkable surge. Notably, the years 2017 to 2019 marked a substantial boom in telemedicine publications, setting the stage for a consistent and substantial increase from 2019 to 2021. The pinnacle of this growth was witnessed in 2021, with an impressive 1168 publications, making it the most prolific year for telemedicine research. The data suggest a significant and sustained interest in the field, underscoring its importance in contemporary research.

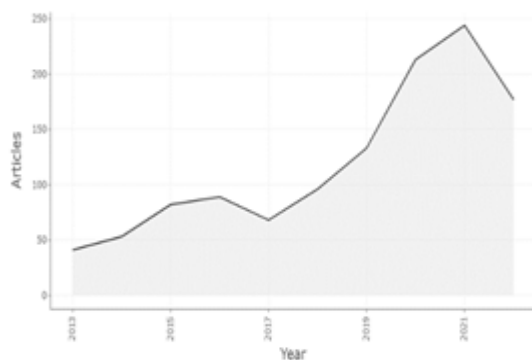


Figure 1: Publication trends on telemedicine in India

Most Relevant Research Affiliations

Table 2 highlights the leading telemedicine research institutions, with the “All India Institute of Medical Science” securing the top spot by contributing 270 research articles. Following closely by “Postgraduate Institute of Medical Education and Research” with 135 articles and the “National Institute of Mental Health and Neuroscience” with 96 articles. On the lower end, the “London School of Hygiene and Tropical Medicine” and “VIT University” have the fewest publications, each with 29 articles.

Table 2 Most Relevant Research Affiliations	
Institutions	No of Articles
All India Institute of Medical Science	270
Postgraduate Institute of Medical Education and Research	135
National Institute of Mental Health and Neuroscience	96
Sastra University	53
Sanjay Gandhi Postgraduate Institute of Medical Sciences	34
L V Prashad Eye Institute	33
London School of Hygiene and Tropical Medicine	29
VIT University	29

Most Cited Documents

Table 3 presents the top 10 research articles on telemedicine, ranked by the number of local citations they received. These papers, published between 2013 and 2020, collectively garnered over 800 global citations, as illustrated in Table 3. The most influential work, titled 'Telemedicine for diabetes care in India during COVID-19 pandemic' by GHOSH A, earned 15 local and 128 global citations, making it the most cited in the list. Following closely by NAIR AG's "Effect of COVID-19 related lockdown on ophthalmic practice and patient care in India," with 14 local and 125 global citations. On the other end, 'Medical Image Watermarking Technique for Accurate Tamper Detection in ROI and Exact Recovery of ROI' received the least citations, with 7 local and 47 global citations. Interestingly, two prominent themes within telemedicine research emerged: Watermarking and Telecare Medical

Information Systems. Among the 10 articles, four focus on telecare medical information systems, while two delve into the topic of watermarking. These findings underscore the significance and popularity of these subjects in the field of telemedicine

Table 3. Highly locally cited articles					
Title	Source	Year	Local Citations	Global citations	DOI
“Telemedicine for diabetes care in India during COVID-19 pandemic”	Diabetes & Metabolic: Clinical Research & Review	2020	15	128	https://doi.org/10.1016/j.dsx.2020.04.001
“Effect of COVID-19 related lockdown on Ophthalmic Practice and Patient Care in India”	Indian Journal of Ophthalmology	2020	14	125	https://doi.org/10.4103/ijo.IJO_797_20
“A Secure and Efficient Chaotic Map-Based Authenticated Key Agreement Scheme for Telecare Medicine Information Systems”	Journal of Medical System	2014	10	54	httphttps://doi.org/10.1007/s10916-014-0120-3
“Mobile Phones: The Next Step towards Healthcare Delivery in Rural India?”	PLOS ONE	2014	10	82	https://doi.org/10.1371/journal.pone.0104895
“Cryptanalysis and Improvement of Authentication and Key Agreement Protocols for Telecare Medicine Information Systems”	Journal of Medical System	2014	8	82	https://doi.org/10.1007/s10916-014-0135-9
“An Authentication Scheme for Secure Access to Healthcare Services”	Journal of Medical System	2013	8	55	https://doi.org/10.1007/s10916-013-9954-3
“Telephonic review for outpatients with epilepsy—A prospective randomized, parallel-group study”	European Journal of Epilepsy	2017	7	54	httphttps://doi.org/10.1016/j.seizure.2017.11.003
“A blind medical image watermarking: DWT-SVD based robust and secure approach for telemedicine applications”	Multimedia Tools and Applications	2017	7	125	https://doi.org/10.1007/s11042-016-3928-7
“Medical Image Watermarking Technique for Accurate Tamper Detection in ROI and Exact Recovery of ROI”	International Journal of Telemedicine and Applications	2014	7	47	https://doi.org/10.1155/2014/984646
“A Biometric Authentication Scheme for Telecare Medicine Information Systems with Nonce”	Journal of Medical System	2013	7	64	Httphttps://doi.org/10.1007/s10916-013-9964-1

Table 4 compiles the list of authors who are the most productive together with their affiliation with telemedicine. The author have between 13 and 24 publications. The author with the highest number of publications is ranked one and so on. KUMAR A distinguished himself as a leading author with 23 publications and 421 citations. The highest value of the h-index (10) and g-index (20) is also obtained from him. Second place is acquired by Gupta A with 22 publications and 361 citations.

Author	TP	TC	H-index	g-index
KUMAR A	23	421	10	20
GUPTA A	22	361	9	19
KUMAR S	18	249	9	15
MANJUNATHA N	16	64	5	7
SINGH A	14	95	7	9
MATH SB	14	55	5	7
SHARMA A	13	158	6	12
SINGH P	13	81	6	9
KUMAR CN	13	49	5	6
SINGH S	13	103	5	10

Given that the reviewed publications were scattered throughout numerous journals, it is clear how important this topic is. The fact that the two articles in Figure 2 are connected by lines denotes that they have been discussed together in other publications. In bibliometric analysis, this form of interaction between citations is known as co-citation. The line's thickness, which is related to the article's relevancy, displays the number of co-citations. The dense network shows the significant attention that telemedicine has gotten from numerous scientific sources. (Wei et al., 2012) and (Zhu, 2012) are the two articles that are cited the most frequently by other works. Both publications were

Figure 1 is a network diagram illustrating the relationships between researchers in the field of network medicine. The nodes represent researchers, and the edges represent their collaborative relationships. The nodes are color-coded and labeled with names and years. The central node is 'wei j. 2012' in red. Other prominent nodes include 'zhu z. 2012' in red, 'kocher p. 1999' in blue, and 'messinger s. 2002' in blue. The network is dense with many connections between nodes.

Top 10 Research Journals

Sources	No of Articles
Journal of Medical System	51
Indian Journal of Ophthalmology	28
Diabetes and Metabolic Syndrome: Clinical Research	27
Multimedia Tools and Applications	20
Indian Journal of Psychological Medicine	17
PLOS One	16
Journal of Advanced Research in Dynamical and Control System	15
BMJ Open	14
International Journal of Applied Engineering Research	13
Telemedicine and E-Health	13

terms such as COVID-19, health, and authentication emerge prominently among authors' preferences. The close relationship between COVID-19 and screening is evidenced by their shared color, underscoring the interconnection of these keywords. Furthermore, associations are observed between telemedicine and medical image. On the other hand, digital health and eHealth appear less frequently. Interestingly, keywords like hypertension, teleneurology, and image authentication are used less frequently in the literature.

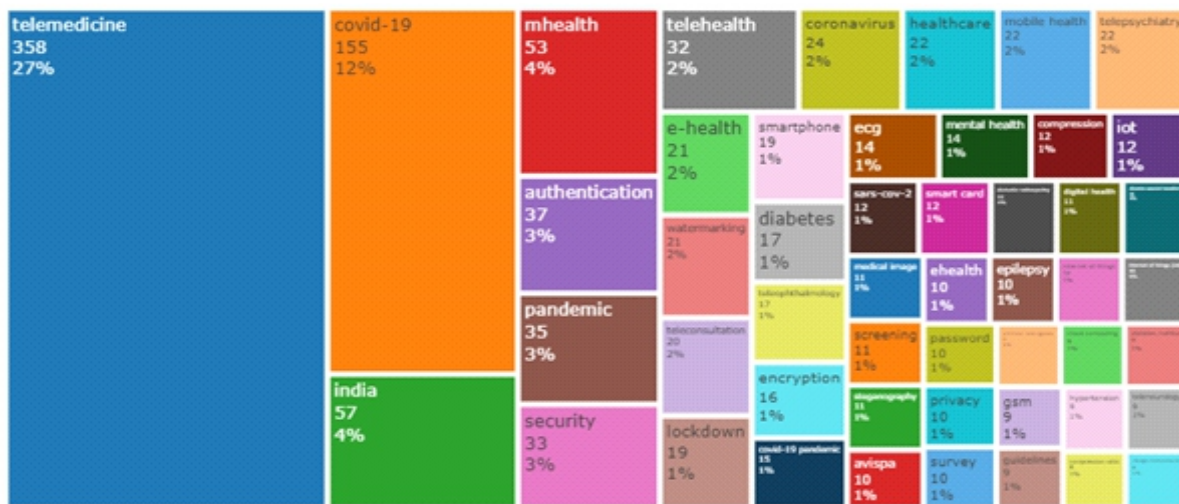


Figure 3. World Tree Map

Keyword Analysis

The analysis of the authors' keyword usage for the telemedicine research reveals that they used 50 different keywords. Figure 4 displays a network of author keywords that co-occur with a minimum of five instances for each item. The ball's

size and color stand for the size of the cluster and its strong network. From the author's keywords, four clusters were formed, showing a high association between each term in the cluster. 1. Applications of telemedicine, 2. Role of Telemedicine in Pandemic, 3. Security and privacy and 4. Artificial Intelligence in Healthcare.

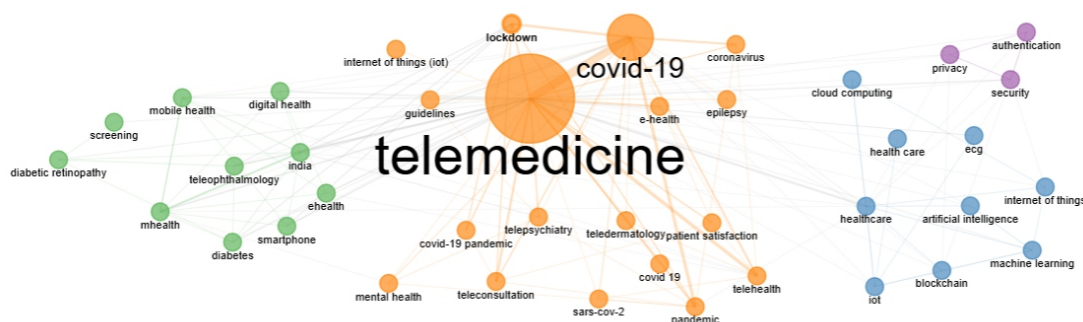


Figure 4. Keywords Co-occurrence Network

Keywords of the same color are closely related and usually used together. The first cluster discusses the tools used for telemedicine, including mobile applications and smartphones, as well as the management and procedure. The role of telemedicine in pandemics is covered in the second cluster. The third cluster is concerned about the

confidentiality and security of patient data while using telemedicine. Artificial Intelligence in healthcare is the last cluster. It includes application of various aspects of artificial intelligence in healthcare such as machine learning, cloud computing, blockchain etc.

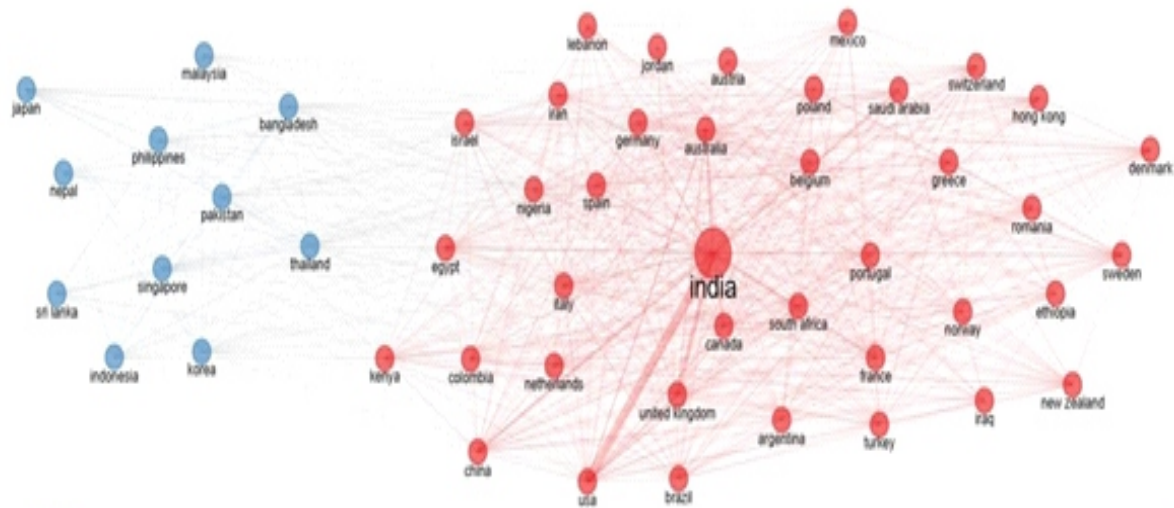


Figure 5: India's collaboration Network with other countries.

India's Collaboration with Other Countries

India actively engages in international collaboration, as depicted in Figure 5. While India's contribution in terms of published articles may not be extensive, the country excels in collaborative efforts. Notably, the United States emerged as a key partner, co-authoring 117 documents with India. Additionally, strong collaborations exist with the United Kingdom, contributing 86 publications, and Australia, with 43 jointly published articles. This underscores India's commitment to global cooperation in research and knowledge exchange.

Conclusion

Telemedicine was tremendously useful during the COVID-19 crisis. Telemedicine has helped the nations to control the spread of illness. The pandemic has increased its

significance, making it a popular research topic. Therefore, the goal of this study is to synthesize the literature and provide future researchers with a comprehensive understanding of this subject. The list of significant authors and sources of references produced by this study will aid scholars in finding articles of high caliber. "Journal of Medical System" is one of the best journals. The leading institute in India with the most articles is the "All-India Institute of Medical Science". Kumar A is the most prolific and well-known author among others with 23 articles published, he stands out among other writers and has the most citations (421), g-index, and h-index followed by Gupta. Other Indian authors also contributed to the publication journey between 2013 and 2022. "Telemedicine for diabetes care in India during

COVID-19 pandemic” and “Effect of COVID-19 related lockdown on ophthalmic practice and patient care in India” are the most significant articles as they have received the maximum local citations and global citations, whereas most co-cited publications are from (Zhu, 2012) and (Wei et al., 2012). By analyzing the author's keywords, four clusters have been found, including applications and management of telemedicine, pandemics, security and privacy issues, and artificial intelligence in healthcare. The term telemedicine, which appears 358 times, is the most frequent among the other terms, followed by covid-19 (155), India (57), health (53), and authentication (37). The USA has won the limelight by creating a maximum number of articles in collaboration with India. This study could be used by the researcher to pinpoint the most crucial problems and gaps that require immediate attention.

Limitations and Future Directions

Regarding the limitations, Scopus was the sole data source used in the current investigation. The study would probably be much improved by getting data from multiple databases like PubMed, Web of Science, or Google Scholar. Given this, it's probable that some important papers that were only listed in one of these databases were ignored. The sole term utilized in the database query was “Telemedicine”. Future researchers can investigate more pertinent terms associated with telemedicine, such as video consultations, remote health services delivery, teleconsultation, mobile health, health applications, and mHealth, for a more thorough investigation. Since only English articles were considered, we excluded publications that have

been published in other languages. These articles may offer more perceptive data. Only final papers that appeared in journals between 2013 and 2022 were taken into consideration. The inclusion of articles published prior to 2013 may provide different findings. Furthermore, this article is confined to the author's keywords for keyword analysis. Leaving out pertinent information from the article's titles and abstracts might give a partial picture of the subject. To gain a more comprehensive perspective, researchers are encouraged to explore additional scientific paper repositories, especially those with a national focus, and incorporate a wider range of keywords. Notwithstanding limitations, the conclusions of this analysis provide insight into the existing research and future directions for investigation, and it can be used as a basis for learning more about telemedicine in India. Aspiring researchers can easily locate the top articles, prolific authors, and areas of research hotspots for telemedicine in the Indian context.

References

- Agarwal, N., Jain, P., Pathak, R., & Gupta, R. (2020). Telemedicine in India: A tool for transforming health care in the era of COVID-19 pandemic. In *Journal of Education and Health Promotion* (Vol. 9, Issue 1). https://doi.org/10.4103/jehp.jehp_472_20
- Aneja, J., & Arora, S. (2021). Telemedicine and ethics: opportunities in India. *Indian Journal of Medical Ethics*, VI(4). <https://doi.org/10.20529/IJME.2021.042>
- Chandwani, R. K., & Dwivedi, Y. K. (2015). Telemedicine in India: current state, challenges and opportunities. *Transforming Government: People, Process and Policy*, 9(4). <https://doi.org/10.1108/TG-07-2015-0029>
- Dash, S., Aarthy, R., & Mohan, V. (2021).

- Telemedicine during COVID-19 in India—a new policy and its challenges. In *Journal of Public Health Policy* (Vol. 42, Issue 3). <https://doi.org/10.1057/s41271-021-00287-w>
- Dinakaran, D., Manjunatha, N., Kumar, C. N., & Math, S. B. (2021). Telemedicine practice guidelines of India, 2020: Implications and challenges. In *Indian Journal of Psychiatry* (Vol. 63, Issue 1). https://doi.org/10.4103/psychiatry.In dianJPsychiatry_476_20
 - Donthu, N., Gremler, D. D., Kumar, S., & Pattnaik, D. (2022). Mapping of Journal of Service Research Themes: A 22-Year Review. In *Journal of Service Research* (Vol. 25, Issue 2). <https://doi.org/10.1177/1094670520977672>
 - Gajarawala, S. N., & Pelkowski, J. N. (2021). Telehealth Benefits and Barriers. *Journal for Nurse Practitioners*, 17(2). <https://doi.org/10.1016/j.nurpra.2020.09.013>
 - Galagali, P. M., Ghosh, S., & Bhargav, H. (2021). The Role of Telemedicine in Child and Adolescent Healthcare in India. In *Current Pediatrics Reports* (Vol. 9, Issue 4). <https://doi.org/10.1007/s40124-021-00253-w>
 - Ghosh, A., Gupta, R., & Misra, A. (2020). Telemedicine for diabetes care in India during COVID19 pandemic and national lockdown period: Guidelines for physicians. *Diabetes and Metabolic Syndrome: Clinical Research and Reviews*, 14(4). <https://doi.org/10.1016/j.dsx.2020.04.001>
 - Gupta, R. (2018). Lost in Numbers: The Art and Science of Medicine. *RUHS Journal of Health Science*, 3(2). <https://doi.org/10.37821/ruhsjhs.3.2.2018.59-60>
 - Gupta, R., Ghosh, A., Singh, A. K., & Misra, A. (2020). Clinical considerations for patients with diabetes in times of COVID-19 epidemic. In *Diabetes and Metabolic Syndrome: Clinical Research and Reviews* (Vol. 14, Issue 3). <https://doi.org/10.1016/j.dsx.2020.03.002>
 - Haleem, A., Javaid, M., Singh, R. P., & Suman, R. (2021). Telemedicine for healthcare: Capabilities, features, barriers, and applications. In *Sensors International* (Vol. 2). <https://doi.org/10.1016/j.sintl.2021.100117>
 - Kaeley, N., Choudhary, S., Mahala, P., & Nagasubramanyam, V. (2021). Current scenario, future possibilities and applicability of telemedicine in hilly and remote areas in India: A review protocol. *Journal of Family Medicine and Primary Care*, 10(1). https://doi.org/10.4103/jfmpe.jfmpe_1085_20
 - Kappal, R., Mehndiratta, A., Anandaraj, P., & Tsanas, A. (2014). Current Impact, Future Prospects and Implications of Mobile Healthcare in India. *Central Asian Journal of Global Health*, 3(1). <https://doi.org/10.5195/cajgh.2014.116>
 - Kasthuri, A. (2018). Challenges to healthcare in India - The five A's. In *Indian Journal of Community Medicine* (Vol. 43, Issue 3). https://doi.org/10.4103/ijcm.IJCM_194_18
 - Kichloo, A., Albosta, M., Dettloff, K., Wani, F., El-Amir, Z., Singh, J., Aljadah, M., Chakinala, R. C., Kanugula, A. K., Solanki, S., & Chugh, S. (2020). Telemedicine, the current COVID-19 pandemic and the future: a narrative review and perspectives moving forward in the USA. In *Family medicine and community health* (Vol. 8, Issue 3). <https://doi.org/10.1136/fmch-2020-000530>
 - Mishra, S. K., Kapoor, L., & Singh, I. P. (2009). Telemedicine in India: Current Scenario and the Future. *Telemedicine and E-Health*, 15(6). <https://doi.org/10.1089/tmj.2009.0059>
 - Mishra, S. K., Singh, I. P., & Chand, E. D. (2011). Current Status of Telemedicine Network in India and Future Perspective. *Proceedings of the Asia-Pacific Advanced Network*, 32(0). <https://doi.org/10.7125/apan.32.19>
 - Perednia, D. A., & Allen, A. (1995). Telemedicine Technology and Clinical Applications. *JAMA: The Journal of the American Medical Association*, 273(6). <https://doi.org/10.1001/jama.1995.03520300057037>
 - Rajkumar, E., Gopi, A., Joshi, A., Thomas, A. E., Arunima, N. M., Ramya, G. S., Kulkarni, P., Rahul, P., George, A.

- J., Romate, J., & Abraham, J. (2023). Applications, benefits and challenges of telehealth in India during COVID-19 pandemic and beyond: a systematic review. *BMC Health Services Research*, 23(1). <https://doi.org/10.1186/s12913-022-08970-8>
- Sikka, A. (2022). TELEMEDICINE - A CRITICAL ANALYSIS OF ITS FUTURE IN INDIA. *International Journal of Advanced Research*, 10(11). <https://doi.org/10.21474/ijar01/15707>
 - Suban, S. A., Madhan, K., & Shagirbasha, S. (2021). A bibliometric analysis of Halal and Islamic tourism. *International Hospitality Review*. <https://doi.org/10.1108/ihr-05-2021-0038>
 - Venkataraman, A., Fatma, N., Edirippulige, S., & Ramamohan, V. (2024). Facilitators and Barriers for Telemedicine Systems in India from Multiple Stakeholder Perspectives and Settings. *Telemedicine and E-Health*. <https://doi.org/10.1101/2023.04.23.23288980>
 - Wei, J., Hu, X., & Liu, W. (2012). An improved authentication scheme for telecare medicine information systems. *Journal of Medical Systems*, 36(6). <https://doi.org/10.1007/s10916-012-9835-1>
 - Zhu, Z. (2012). An efficient authentication scheme for telecare medicine information systems. *Journal of Medical Systems*, 36(6). <https://doi.org/10.1007/s10916-012-9856-9>
 -