

A cross-sectional study on utilization and barriers of eSanjeevani telemedicine services in rural areas of South India: Curing at a distance

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Abstract

Background: Telemedicine services are essential in a country like India, where the doctor-to-patient ratio and hospital-to-population ratio are lower than the World Health Organization (WHO)-recommended ratio. To prevent the long waiting time for doctor appointments, diagnosis, and treatment plans in person, an alternative system such as eSanjeevani telemedicine is necessary to tackle medical emergencies in a populated country like India. **Objectives:** To assess the utilization and barriers affecting the utilization of eSanjeevani services among residents of rural areas in Karnataka. **Materials and Methods:** A Cross-sectional community study was conducted in the rural areas of south India, using a pre-tested semi-structured interview schedule. Multistage cluster sampling method was used to select 400 households. The collected data has been expressed in terms of frequencies and percentages. **Results:** The study identified that most of the study participants were from lower middle class as per the modified Kuppuswamy Scale. Only 34.8% were aware of the eSanjeevani services and among them 22% utilized eSanjeevani services in which General medicine services (86.3%) were used the most. Major barriers for utilization included network issues (29%) followed by no room for queries/questions (20%). **Conclusion:** Telemedicine has the potential to enhance the availability and accessibility of healthcare to everyone. At the moment, lack of awareness, low network connectivity, and inherent technological limits pose major challenges for accessing telemedicine. Utilization of telemedicine can be increased by making people aware about the advantages of using it through strong Information, Education and Communication and media publicity.

Keywords: Telehealth, Virtual medicine, Remote consultation, Utilization.

Introduction

India is the world's most populous country with over 1.4 billion population⁽¹⁾, where the available healthcare human resources are less, serving the entire population especially in remote areas. The lack of sufficient doctors and other healthcare workers makes it difficult to distribute health care services in an adequate and equitable manner^(2,3). The major barriers to provide healthcare in rural India include lack of awareness, poor access, lack of staff, lack of affordability, and poor accountability⁽⁴⁾. Past experiences have been a proof that telemedicine could fill the gap in the provision of medical care to rural areas. Since the start of the coronavirus pandemic, the enhanced capabilities have transformed telehealth delivery, and it has been one of our most important allies^(2,3).

The concept of telemedicine is referred as "curing at a distance"⁽⁵⁾. The term is often used to refer to activities such as education, research, health surveillance, health promotion and providing treatment⁽⁶⁾. Telemedicine refers to delivering healthcare services by healthcare professionals utilizing Information Communication Technology (ICT) in situations where distance is a significant consideration. It facilitates the transmission of reliable information for research, evaluation,

diagnosis, treatment, and prevention of disease and injury. It also helps to relieve hospital overcrowding⁽⁷⁾.

History of telemedicine

Telemedicine's first use reported in 1897 for the diagnosis of a child with croup over phone^(8,9). Telemedicine services have expanded significantly since the 1990s and have been utilized in many medical specialties since their inception at the University of Nebraska College of Medicine in 1959⁽¹⁰⁾.

The early development of telemedicine was initiated by Department of Electronics and information Technology (DeitY), Master of Computer and Information Technology (MCIT), Government of India in 1999. Telemedicine was introduced in India at AIIMS, New Delhi, PGIMER Chandigarh, and ISRO started telemedicine services in 2000 at Apollo Hospital, Argonda. A National Telemedicine Task Force was established by the Ministry of Health and Family Welfare (MoHFW) in India's health sector in 2005⁽¹¹⁾. With the help of computers and communication technologies, a number of telemedicine initiatives have been developed over the years with the aim of providing healthcare to underserved populations in rural India. These telemedicine initiatives have received support from both the public and private sectors. One of the ground-breaking projects funded by the

Ministry of Communications and Information Technology, Government of India is "Development of Telemedicine Technology", which was established at the Center for Development of Advanced Computing (CDAC) in Mohali in 1999 with the specific objective of improving the current healthcare delivery system^(12,13). This is the first telehealth online Out-patient Department (OPD) platform developed by CDAC to provide consultation through two eSanjeevani domains such as eSanjeevani AB-HWC', a doctor-to-doctor telemedicine platform and "eSanjeevani OPD – Stay Home OPD", a doctor to patient telemedicine system, which aims to create a digital health ecosystem in the country to facilitate global care and improve health outcomes⁽¹⁴⁻¹⁶⁾. Larger government and medical college hospitals in states operate as "hubs" in the hub-and-spoke model used by eSanjeevani, while numerous Sub Centers (SCs) and Primary Health Centers (PHCs) in the periphery operate as "spokes". Community Health Officers (CHOs) positioned at peripheral centers receive telemedicine services from physicians at different hubs⁽¹⁷⁾.

Policymakers around the world thought to introduce new telemedicine regulations during the pandemic to facilitate and control operations. The Indian Medical Council Act, 1956 established a framework under Government of India in collaboration with Board of Governors to develop telemedicine practice guidelines in 2020⁽¹⁸⁾. The purpose of these guidelines is to provide physicians and healthcare providers with practical ideas on how to integrate telemedicine into their care delivery service models. The goal is to ensure patient and professional safety by providing effective and safe care based on current information, available resources and patients' needs⁽¹⁹⁾.

Telemedicine was a welcome decision because it has rapidly expanded in India over the past few years, peaked during COVID-19, and is expected to grow by 31% compound annual growth rate between 2020 and 2025⁽²⁰⁾. Present study was conducted to assess the utilization of eSanjeevani and to know about the barriers that limit utilization among households in rural areas in Karnataka. The findings of this study could be utilized to improve eSanjeevani's availability and utility.

Objective

To assess the utilization and barriers affecting the utilization of eSanjeevani services among residents of rural areas of Karnataka.

Materials and Methods

Study design: A community based cross-sectional research study design was used.

Study duration and location: This study was conducted between November 2022 and April 2023 among rural areas in Gadag taluk of south India, Karnataka.

Eligibility Criteria: All the households in the study area.

Study sample size: The sample size was estimated using the prevalence/proportion method with the formula $n = 4pq/L^2$. Since there were no previous studies available during the inception of the study, p has been considered to be equal to 50% (0.5), and L is taken to be 5⁽²¹⁾. The estimated sample size was 400 after calculation.

Sampling design: Multistage Cluster Sampling method was used as shown in Fig 1.

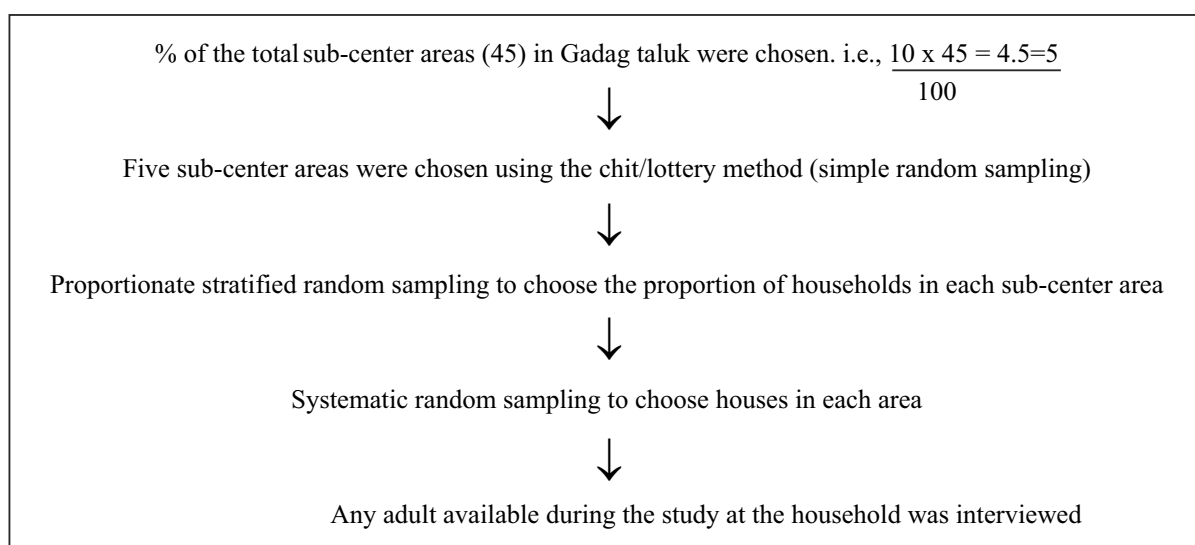


Figure 1: Diagrammatic representation of sampling method used for the study

Operational Definition for utilization of eSanjeevani: Any member of the family has used the service in the past six months.

Data collection tools: A semi-structured interview schedule was developed following telemedicine guidelines and through a literature review. A pilot study was done to pre-test the tool. On the day of the data collection, written consent was obtained from the participants, and an interview schedule was administered.

Data analysis: The quantitative data was analyzed using Microsoft Excel 2019 (Microsoft, Washington, USA) to generate frequencies, percentages, tables, and graphs.

Results

Demographic characteristics

A total of 400 participants were included in the study, and most of them (32%) belonged to the age group of 31 to 40 years. About 53.7% were males, 29% were illiterate, followed by 28% who were educated up to high school, 14.7% middle school, 13.7% intermediate, 3.5% graduates, and only 0.25% postgraduates. The majority fell in the occupation category of clerical/shop/farm (58.25%),

followed by semiskilled (13%) and unskilled workers (9.75%). In all, 64.5% of the family income per month was between 500-749 INR, and 38.5% belonged to the upper lower class as per the modified Kuppuswamy scale. The majority of them lived in nuclear families (54%), and 87.75% were Hindus.

Utilization of eSanjeevani

One-third (34.75%) of the participants were aware of eSanjeevani services. The major source of awareness was from health care personnel (95.7%), followed by TV/newspaper (4.3%), and 65.25% were not aware of eSanjeevani services (Table 1). Overall utilization of eSanjeevani in the families of the study participants was 22%. Also, 22% informed eSanjeevani services are important for seeking treatment. The major benefits of the utilization of eSanjeevani services were easy follow-ups (60%) and no need to travel and save time and money (38.6%). The utilization of eSanjeevani services was less due to a lack of awareness, and 8.3% didn't trust the online consultation. Many participants informed they needed to go to the hospital even after obtaining eSanjeevani consultation as they couldn't trust their treatment.

Table 1: Distribution of participant's awareness and services utilization of eSanjeevani

Variable	n (%)
Participants aware of eSanjeevani (n=400)	
Yes	139 (34.75)
No	261 (65.25)
Source of information about eSanjeevani (n=139)	
TV/newspaper	6 (4.3)
Health care personal	133 (95.7)
Telemedicine services (eSanjeevani) are necessary (n=400)	
Yes	88 (22)
No	312 (88)
Utilized eSanjeevani services (n=400)	
Yes	88 (22)
No	312 (88)
n = Number of households	

Functionality of eSanjeevani services among users

Among all the utilizers, only 32.9% were able to understand and easily operate the telemedicine user interface, and 53.4% said it was easy to connect to the doctor for consultation, while 32.9% were not satisfied with the audio and video

quality of consultation, and 38.6 % were not able to fully convey their health complaints to the doctor. Majority i.e., 85% reported that the traditional method of consultation is better than teleconsultation, and only 22% will recommend telemedicine (Table 2)

Table 2: Distribution of the functionality of eSanjeevani services among users (n=88)

Variable	n (%)
Easily understand and operate the telemedicine user interface	
Yes	29 (32.9)
No	59 (67)
Easy to connect to the doctor	
Yes	47 (53.4)
No	41 (46.5)
Satisfied with the audio and video quality of the consultation	
Yes	59 (67)
No	29 (32.9)
Able to fully convey health complaints to the doctor	
Yes	54 (61.3)
No	34 (38.6)
Able to download the e-prescription and procure medicine easily after the consultation	
Yes	8 (9)
No	80 (90.9)
eSanjeevani consultation is better than conventional hospital-based consultation	
Yes	13 (14.7)
No	75 (85.2)
Willing to recommend this mode of consultation to others	
Yes	20 (22.7)
No	68 (77.2)

Most of the eSanjeevani services were utilized for General Medicine (86.3%), followed by Cardiology (5.6%), Gynecology (3.4%) and 1.1% each for Pulmonology, Neurology, General Surgery, Radiology (Figure 2).

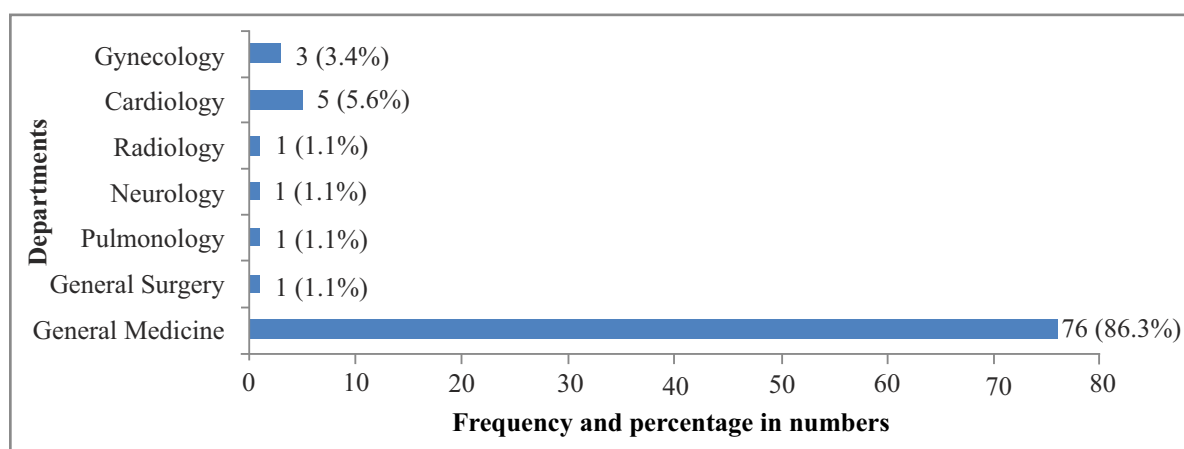


Figure 2: Frequency distribution of calls attended in each department

Among 88 users, 68 users mentioned about the barriers faced while utilizing services. Network issue/poor connectivity (38.2%) was the main barrier for utilization, no room for

queries/questions was reported by 26.4%, 19% reported doctor unavailability and 16% reported more waiting time to consult a doctor (Figure 3).

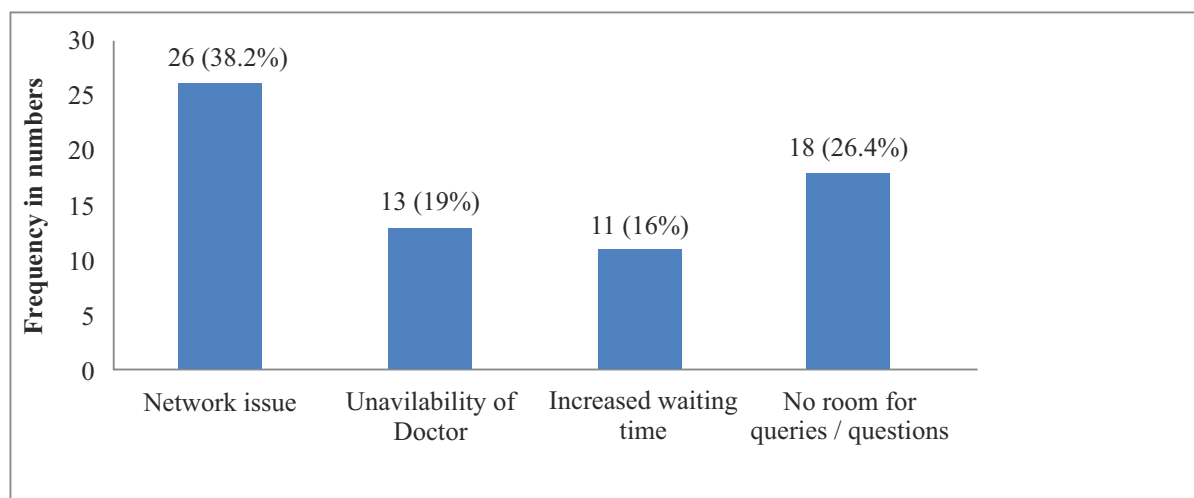


Figure 3: Barriers for eSanjeevani service utilization among users

Discussion

Telemedicine has the potential to revolutionize the health sector. The present study comprises 400 rural households, which includes majority of males, 32% were aged 31-40 years, 54.5% of them were from the lower middle class, and most (54%) of them lived in nuclear families. Hindus were 87.75% and Muslims 12.3%. A study done by Nisha et al.⁽²³⁾ in Delhi reported that the majority of participants (81%) were aged 41 to 70 years, while 21% of participants were from socioeconomic status III, 79% of participants were from socioeconomic status IV, and none of the participants fell into status I or II. They were mostly Hindus (81%) and Muslims (19%).

Utilization of eSanjeevani services among household participants

Utilization of eSanjeevani was 22%, which is low, and only 34.75% were aware of its existence. Only 22% of participants believed eSanjeevani services were required, and the major benefit was easy to follow up with 60%, and 38% believed there was no need to travel to receive care, which can save time and money. In a study by Almathami et al.⁽²⁴⁾, the main benefits of using the services were saving time for patients and healthcare providers by eliminating travel time, reducing hospital patient waiting times, and reducing the cost of medical service.

Distribution of calls attended in each department

Majority i.e., 86.3% of the consultations over the year were for the General Medicine department due to the high number of patients seeking care for fever and the common cold, followed by Cardiology, and Gynecology, Radiology,

General Surgery, Neurology, and Pulmonology. A similar study done by Dinesh et al.⁽²⁵⁾ in Rajendra Prasad Government Medical College in Northern India included 54% males, General Medicine saw the majority of cases 41%, followed by Dermatology 14%, Orthopedics 11.6%, surgery 7.7%, OBG 6.3%, Psychiatry 5.3%, Ophthalmology 5%, ENT 4%, and Dentistry 0.5%. In a study done by Adity et al.⁽²⁶⁾ at a telemedicine center in Government Medical College, Ayodhya, the department of Obstetrics and Gynecology received (15.9%) a maximum number of calls, followed by Psychiatry (11.1%), Dentistry (10.4%), Surgery (10.2%), General Medicine (8.8%), ENT (7.5%), Ophthalmology (7.38%), Orthopedics, and Pediatrics (6.1%).

Barriers to service utilization among household participants

According to this study, there were various barriers at the time of eSanjeevani utilization, such as network problems (29%), inadequate connectivity, and reduced visual and audio clarity. Seeking treatment online poses challenges because there may be a risk of miscommunication and incorrect diagnosis. Availability of the doctor was less (14%), which increased waiting time (12%). The primary problem in using the eSanjeevani service is the absence of a physical checkup. Due to which they were again going for conventional care to clarify the diagnosis and treatment. A study done by Kanwar et al.⁽⁴⁾, in the remote areas of Himachal Pradesh, barriers reported were a lack of awareness of the telemedicine services (75.9%), insufficient network connectivity (82.8%) and a lack of digital literacy (55.2%) forced them to choose in-person consultations over the facility's telemedicine services. A study by Almathami et al.⁽²⁴⁾ reported challenges as the patients' negative perceptions of the privacy and security

of eSanjeevani consultations, the slow internet speed, and the poor audio and video quality. In a study by Rajesh et al.⁽²⁷⁾, in Apollo Hospital, 24% of telemedicine patients had technical problems, and 18% were dissatisfied with the care they received, with the main problems being discomfort in front of the camera and lack of direct face-to-face contact with the doctor.

Limitations

This study was limited to households in rural areas. A qualitative study would provide a better insight to understand in-depth barriers and perception of the households.

Recommendations

- Create awareness regarding eSanjeevani services by Information, Education and Communication (IEC) and advertisements
- Improve network connection at service centers
- Timely doctor availability to improve health care provision during the teleconsultation

Conclusion

This study concluded that there is still a need to improve the awareness and utilization of eSanjeevani among the community in spite of its early success during the pandemic. The utilization is low due to the reduced awareness regarding services and poor timely doctor availability among the community. Patients can benefit greatly from eSanjeevani in terms of ease, reliability, access to healthcare, and cost savings. Increase utilization by raising knowledge and acceptability of telemedicine services at the local level through strong IEC and media publicity regarding the availability of services may be conducted by local health administrative authorities. Further qualitative studies can be conducted to understand the barriers better and come up with workable solutions.

Conflict of Interest: Nil

Source of Support: Nil

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Ethical consideration

Karnataka State Rural Development and Panchayat Raj University, Gadag Institutional Ethics Committee approved study with the no: RDPRU/SEP/IEC/4/2021. The District Health and Family Welfare Office of Gadag was also

consulted regarding administrative authorization for data collection. The informed consent of enrolled participants was obtained before collecting data.

Authors' Contribution

KC: Conceptualization, designing the study, data collection, implementation, data analysis, implementation, manuscript writing. NSJ: Conceptualization, designing the study, data analysis, implementation, manuscript writing

Data availability statement

Data will be available with corresponding author on request.

References

1. India Demographics 2023. Population, Age, Sex, Trends. Available from: <https://www.worldometers.info/demographics/india-demographics/>. Accessed on 08 Jan 2024.
2. Colbert GB, Venegas-Vera AV, Lerma EV. Utility of telemedicine in the COVID-19 era. *Reviews in cardiovascular medicine*. 2020 Dec 30;21(4):583-7.
3. Agarwal N, Jain P, Pathak R, Gupta R. Telemedicine in India: A tool for transforming health care in the era of COVID-19 pandemic. *Journal of education and health promotion*. 2020 Jan 1;9(1):190.
4. Kanwar V, Chaudhary S, Sharma AK. Challenges in Implementing Digital Health Services in Rural India. *The International Society for Telemedicine and eHealth*. 2023 Jan 1;11(1):1-5.
5. Chellaiyan VG, Nirupama AY, Taneja N. Telemedicine in India: Where do we stand?. *Journal of family medicine and primary care*. 2019 Jun 1;8(6):1872-6.
6. Dixit A, Roy PK. Telemedicine: the way forward in the new normal. *International Journal of Health Systems and Implementation Research*. 2021 Jul 13;5(1):16-20.
7. Emerging Computational Approaches in Telehealth and Telemedicine: A Look at The Post COVID-19 Landscape. Vol. 1. Ed. Madhu G, Kautish S, Govardhan A et al. 2022. 199 p. Available from: <https://books.google.co.in/books?id=nPibEAAAQBA>. Accessed on 22 Feb 2023.
8. Pathak M, Rai S. Telemedicine during COVID-19: India embracing the change. *Indian Journal of Forensic and Community Medicine*. 2021;8(4):262-4.
9. Swarna Priya B, Srinath K, Jammalamadaka A, Hindodi A. Advancement of existing healthcare setting through tele-medicine: the challenges faced in India. *Int J Community Med Public Health*. 2020;8(1):502-6.
10. Sood SP, Bhatia JS. Development of Telemedicine Technology in India: "Sanjeevani"-An Integrated

- Telemedicine Application. *Journal of postgraduate medicine*. 2005 Oct 1;51(4):308-11.
11. Paul S, Sadhu D. Emergence of Telemedicine and E-Health Services in India: A COVID-19 and Post Scenario. In *The Socio-Economic Implications of the Coronavirus Pandemic (COVID-19) in India*. 2022 May 16;5:100–8.
 12. White A, Madisetty M, Kaushal V, Sood SP, Bhatia JS, Sankar CS. Development of a telemedicine case study through US India international research experience for students. In *Decision Sciences Institute Conference, San Diego, CA Proceedings 2010*.
 13. Shukla S, Raychaudhuri PS. Digital technology evolution in healthcare: India's strategy to fight against COVID-19. *Perspect Bus Manag Econ*. 2020;2(10):54–61.
 14. Nagaraja VH, Dastidar BG, Suri S, Jani AR. Perspectives and use of telemedicine by doctors in India: A cross-sectional study. *Health Policy and Technology*. 2024 Jun 1;13(2):100845.
 15. Bajpai N, Wadhwa M. National Teleconsultation Service in India: eSanjeevani OPD. *ICT India Working Paper*; 2021.
 16. Rackimuthu S, Hasan MM, Ray I, Sahito AM, Chawla P, Ghosh D. Teleradiology in India during the COVID-19 pandemic: merits, pitfalls and future perspectives. *Health Policy and Planning*. 2022 Nov 1;37(9):1203-6.
 17. Markan A, Kishore A, Agarwal A, et al. Demographic profile of patients seeking teleophthalmology consultations through e-Sanjeevani: Retrospective analysis of 5138 patients from North India. *Indian Journal of Ophthalmology*. 2022 Dec 1;70(12):4238-43.
 18. Aneja J, Arora S. Telemedicine and ethics: opportunities in India. *Indian J. Med. Ethics*. 2021 Oct 1;6:314-20.
 19. Telemedicine practice guidelines. Available from: <https://www.mohfw.gov.in/pdf/Telemedicine.pdf>. Accessed on 26 Feb 2023.
 20. Samudyatha UC, Tesia P, Tesia S, Subramanyam M. Roadmap to Integrate National Telemental Health Program and MHCA: Signboards that cannot be Ignored. *Indian Journal of Private Psychiatry*. 2022 Mar 16;16(1):50-2.
 21. Naing L, Winn TB, Rusli BN. Practical issues in calculating the sample size for prevalence studies. *Archives of orofacial Sciences*. 2006;1:9-14.
 22. Nisha, Dwivedi S, Gupta SK. Telemedicine as a Cost-effective Tool for Cardiovascular Diseases in Rural India: A Pilot Study in Delhi-NCR. *MGM J Med Sci*. 2019;6(2):58–64.
 23. Almathami HK, Win KT, Vlahu-Gjorgievska E. Barriers and facilitators that influence telemedicine-based, real-time, online consultation at patients' homes: systematic literature review. *Journal of medical Internet research*. 2020 Feb 20;22(2):e16407.
 24. Guleria KS, Patiyal N, Negi AK, Kanwar V, Dinesh K. Utilization of outpatient eSanjeevani National Teleconsultation Service during COVID-19 pandemic in a public healthcare institution in North India. *Indian J Pharm Pharmacol*. 2021;7:265-9.
 25. Priya AD, Vaibhav KU, Srivastava SK, Kumar VI. Telemedicine in times of coronavirus disease-19 at a tertiary care Government Hospital in Uttar Pradesh, India. *Asian J Pharm Clin Res*. 2020;13:190-3.
 26. Acharya RV, Rai JJ. Evaluation of patient and doctor perception toward the use of telemedicine in Apollo Tele Health Services, India. *Journal of family medicine and primary care*. 2016 Oct 1;5(4):798-803.