



Original Article

## Evaluation of Aptitude of Medical Professionals regarding Telemedicine at Tertiary care teaching Hospital: A Cross - Sectional Questionnaire - Based Observation Study

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### ABSTRACT

**Background:** Telemedicine is also referred to as way of providing medical care remotely. It supports the management of various clinical conditions leveraging the widespread reach of mobile technology. The comprehensive understanding and effective implementation of telemedicine in healthcare remain limited. Therefore, the objective of this study is to determine the knowledge, attitude, practice, and perception of telemedicine among medical professionals

**Materials and methods:** A prospective, cross-sectional observational questionnaire based study was conducted for over a period of two months (April – May 2025) in registered medical practitioners were formally informed about the study through an official WhatsApp message which contains Google form link for data collection. Data collected and analyzed using Microsoft Excel 2019.

**Results:** Total 102 participants responded, Most of participants were age between to 21-30 years of age were 71(69.61%). The majority, 72(70.58%) held MBBS + MD/MS qualifications. Overall mean knowledge of participants are 91.18%. 97(95.09%) identified it as a method of providing remote medical care. Telemedicine's convenience for people in remote areas was seen positively where Strongly Agree 27 (26.47%). A majority of respondents, 65 (64%), indicated that they have incorporated telemedicine into their practice. For Privacy concerns about using telemedicine risks such as data breaches or technical issues, participants perceived that 33 (32.35%) somewhat concerned, 26 (25.49%) very concerned.

**Conclusion:** In the study findings indicate that majority of healthcare professionals have satisfactory knowledge about telemedicine, their attitudes and practices shows moderate levels of comfort and utilization.

**Keywords:** Telemedicine, Medical Professionals, Cross Sectional, Telehealth.

### INTRODUCTION

The world is experiencing rapid advancements in audiovisual and digital technologies. With widespread internet access, significant improvements have been made in overcoming time and distance barriers. As a result, remote medicine is progressing at an increasingly quick pace.<sup>[1]</sup>

Information and communication technologies (ICT) are playing an increasingly important and dominant role in the healthcare sector. Telemedicine is becoming an increasingly important part of modern medical practice, in response to the new needs and challenges in the health sector.<sup>[2]</sup>

Telemedicine refers to the usage of Information Communication Technologies (ICT) for the purpose of sharing medical information and providing healthcare in cases where distances hinder the participants to access the health care facility.<sup>[3]</sup>

Thus, Telemedicine is also referred to as 'way of providing medical care remotely'. The World Health Organization has recently defined eHealth as a mixed application of information and communication technology (ICT) for health.<sup>[4]</sup> This emphasizes the cost-effective use of ICT to support various health-related domains, including healthcare services, education, and research.<sup>[5]</sup>

However, people residing in remote areas across the globe scuffle to get high quality health care services, which can be affordable and available in short time. These remote populations usually have poor access to quality healthcare.<sup>[6]</sup>

The rapid growth of mobile phone and internet use in India has opened new avenues for delivering healthcare, especially in rural and remote areas with limited access. Advances in information and communication technologies have made telemedicine a practical solution for addressing healthcare gaps. It supports the management of various conditions such as diabetes, cancer, heart disease, mental health issues, and substance abuse, leveraging the widespread reach of mobile technology.<sup>[6]</sup>

With the widespread adoption of Information and Communication Technology (ICT) across various sectors, the comprehensive understanding and effective implementation of telemedicine in healthcare remain limited. In particular, understanding and behaviors regarding the application of telemedicine for healthcare services especially in India are still insufficiently established. Therefore, we conducted this study to determine the knowledge, attitude, practice and perception of telemedicine among medical professionals, including medical doctors, residents and tutors involved in patient care at a tertiary care hospital in India. The findings of this study may guide the formulation and execution of strategies to enhance telemedicine adoption among healthcare professionals in comparable healthcare settings.

## **MATERIALS AND METHODS:**

### **Study Design:**

A prospective, cross-sectional observational questionnaire-based study was conducted after taking approval from Institutional Ethics Committee (IEC) at a tertiary care teaching hospital.

### **Study Population, Sample Size and Study Period:**

A study was carried out in 102 registered medical professionals of different departments like general medicine, pediatrics, gynecology, general surgery, ophthalmology, ENT, psychiatry, dermatology, pharmacology, pathology, microbiology, orthopedics and various other areas as well of a tertiary care teaching hospital over a period of two months (April – May 2025).

### **Selection Criteria:**

- The study included registered medical practitioners, residents, and tutors who voluntarily agreed to participate and provided informed consent for involvement in the study.

### **Data Collection:**

All registered medical professionals within the targeted population were formally informed about the study through an official WhatsApp message. This message included a direct link to a pre-tested and validated questionnaire<sup>[6]</sup> which was administered electronically via Google Forms to ensure ease of access and data security. The data collection phase was conducted over a continuous two-month period, during which periodic reminder notifications and follow-up messages were systematically disseminated to participants through WhatsApp to encourage timely and maximum response rates.

The pre-validated questionnaire utilized in the study was systematically divided into six comprehensive sections to evaluate various aspects related to telemedicine among medical professionals.

The first section of the form was focused on to obtaining informed consent from participants regarding their voluntary participation in the study. This section clearly mentioned the purpose of the research study and the confidentiality of the data collected. Participants were assured that their participation was entirely voluntary. To indicate their willingness to participate, respondents were provided with two options: 'Yes' to give their consent and proceed with the questionnaire, or 'No' to decline participation. Only those who selected 'Yes' were allowed to continue to the subsequent sections of the form. The second section focused on collecting demographic and professional background information of the respondents. This included the initials of their names, age, gender, highest educational qualifications, and the number of years of clinical or professional experience in the healthcare field.

The third section aimed to assess the participants' knowledge regarding telemedicine. This section consisted of nine multiple-choice questions, each designed with a single correct response to objectively evaluate the respondents' understanding of the fundamental concepts, benefits, and applications of telemedicine.

The fourth section was dedicated to assessing the attitudes of the participants toward the use of telemedicine. It comprised seven statements related to various aspects of telemedicine, including its effectiveness, reliability, and future potential. Responses were measured using a 5-point Likert scale ranging from 'Strongly Agree' to 'Strongly Disagree,' allowing for a detailed assessment of the participants' subjective viewpoints.

The fifth section focused on evaluating the actual practices of telemedicine among the respondents. This section included four multiple-choice questions addressing the frequency of telemedicine services utilized by them.

The sixth and final section explored the perceptions of medical professionals regarding telemedicine. It contained six multiple-choice questions aimed at understanding their overall impressions, perceived advantages and challenges, and their willingness to adopt telemedicine in routine clinical practice.

#### Statistical Analysis:

Data obtained were entered into Microsoft Excel 2019 software. Descriptive analysis was performed and data were expressed in percentages and frequency.

#### RESULTS:

##### Demographics Details

In total, 102 participants responded to survey, among which 56(55%) were male and 46(45%) were female. Most of the study participants were age between to 21-30 years of age were 71(69.61%).

Out of a total of 102 individuals, the majority, 72(70.58%) held MBBS + MD/MS qualifications and followed by 30 (29.41%), held an MBBS qualification. Among the total of 102 individuals, the largest proportion were 3rd Year Postgraduate Residents, comprising 21 individuals (20.59%), followed by 2nd Year PG Residents with 17 individuals (16.67%), and 1st Year PG Residents with 15 individuals (14.71%). Both Professors and Senior Residents accounted for 13 individuals each (12.75%), while Tutors represented 11 individuals (10.78%). Assistant Professors made up 7 individuals (6.86%), and Associate Professors constituted the smallest group with 5 individuals (4.90%).

Among the total of 102 individuals, A total of 74 (9.80%) had < 5 years of experience, while 10 (9.8%) reported 5 years to 10 years of experience. And 18(17.64%) have more than 10 years of Experience shown in (Table 1).

**Table 1: Demographic Details**

Category	Sub-category	Frequency (n)	Percentage (%)
Gender	Male	56	55
	Female	46	45
Age Group	21–30 years	71	69.61
	31–40 years	21	20.59
	41–50 years	4	3.92
	51–60 years	4	3.92
	61–70 years	2	1.96
Qualification	MBBS + MD/MS	72	70.58
	MBBS	30	29.41
Designation	3rd Year PG Resident	21	20.59
	2nd Year PG Resident	17	16.67
	1st Year PG Resident	15	14.71
	Professor	13	12.75
	Senior Resident	13	12.75
	Tutor	11	10.78
	Assistant Professor	7	6.86
	Associate Professor	5	4.9
Years of Experience	< 5 years	74	72.54
	5 years to 10 years	10	9.8
	>10 years	18	17.64

##### Knowledge of Telemedicine

A majority of medical professionals are knowledgeable about telemedicine and its fundamental component. 97(95.09%) identified it as a method of providing remote medical care, with 92(90.2%) identifying video conferencing as the primary tool for remote consultations. 88(86.27%) believe it reduces healthcare costs by limiting in-person visits, while 85(83.3%)

note that limited access to high-speed internet is a major challenge. 97(95.09%) highlight its effectiveness in mental health counseling and follow-up care. To ensure privacy, 95(93.13%) stress the use of secure, encrypted platforms, and an equal percentage emphasize compliance with data protection laws. 98(96.07%) report that psychiatry is the specialty most commonly using telemedicine. 90(88.23%) report that wearable health devices (such as fitness trackers) are commonly integrated with telemedicine for remote patient monitoring depicted in (Table 2). Overall mean knowledge of participants is 91.18%

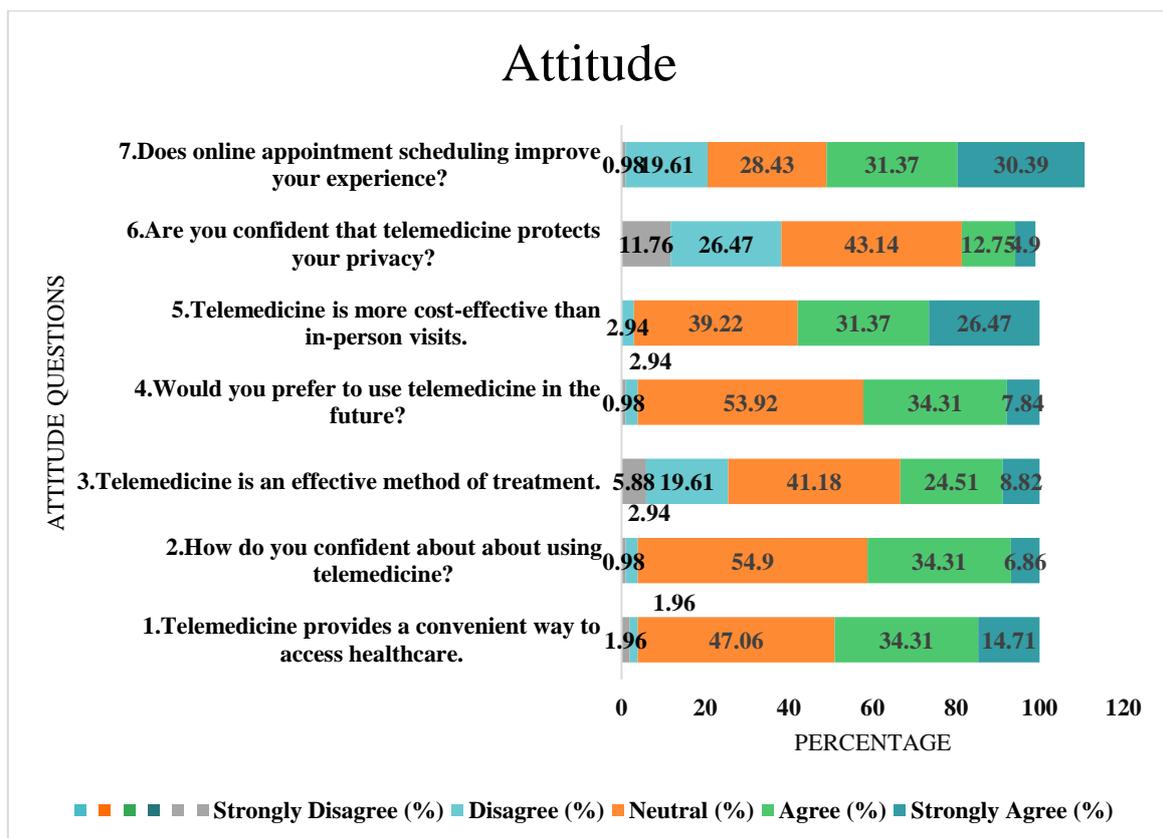
Sr. No.	Questions	Options	Total number (n =102)	Percentage
1	What is telemedicine?	A type of medical research	1	0.98
		A type of medical software	4	3.92
		A way of providing medical care remotely	97	95.09
2	Which technology is most commonly used in telemedicine to facilitate remote consultations between patients and healthcare providers?	Email communication	8	7.84
		Radio signals	2	1.96
		Video conferencing	92	90.19
3	Telemedicine can help reduce healthcare costs by:	Increasing hospital visits	2	1.96
		Making all treatments free of charge	2	1.96
		Reducing the need for expensive in-person consultations	88	86.27
		Requiring more administrative staff	10	9.80
4	Which of the following is a potential challenge related to infrastructure of telemedicine?	Better communication between patients and doctors	11	10.78
		Higher patient satisfaction	5	4.90
		Increased in-person doctor availability	1	0.98
		Limited access to high-speed internet in some regions	85	83.33
5	Telemedicine has the potential to be especially beneficial in which of the following areas?	Emergency surgeries requiring immediate physical presence	3	2.94
		Mental health counseling and follow-up care	97	95.09
		Routine physical examinations	2	1.96
6	What is a key consideration in ensuring the privacy and security of telemedicine consultations?	Employing secure and encrypted platforms for communication	95	93.13
		Sharing passwords between patients and providers	4	3.92
		Using personal email addresses to communicate	2	1.96
		Using social media for health consultations	1	0.98
7	Which of the following is a key regulatory requirement for telemedicine in many countries?	Healthcare providers must maintain patient confidentiality and follow data protection laws	95	93.13
		Patients must receive face-to-face care at least once every year	1	0.98

		Telemedicine can only be used for emergency cases	2	1.96
		Telemedicine consultations must be conducted by video only	4	3.92
8	Telemedicine is most commonly used in which of the following specialties?	Orthopedic surgeries	1	0.98
		Physical therapy sessions	1	0.98
		Psychiatric consultations and follow – ups	98	96.07
		Routine pediatric immunizations	2	1.96
9	Which technology is often integrated with telemedicine platforms to help track patient data remotely?	Digital billboards	12	11.76
		Wearable health devices (like fitness trackers)	90	88.23

**Table 2: Knowledge of Telemedicine**

**Attitude about telemedicine:**

The findings of our study show that majority of the participant were neutral about most aspects of telemedicine. For example, 48 (47.06%) were neutral about its convenience and effectiveness, 56 (54.9%) were neutral about using telemedicine for routine consultations, 42 (41.18%) were neutral about managing chronic conditions, and 55 (53.92%) were neutral about preferring telemedicine for follow-ups. Telemedicine’s convenience for people in remote areas was seen positively, with the highest response being Strongly Agree 27 (26.47%), followed closely by Agree 32 (31.37%). Confidence in telemedicine providing care equal to in-person visits was mixed, with the largest group being Neutral 44 (43.14%), while Disagree 27 (26.47%) and Strongly Disagree 12 (11.76%) combined represent a significant portion expressing doubt about privacy protection. Finally, the majority recognized that online appointments are part of telemedicine, with the highest response being Agree 32 (31.37%) and Strongly Agree 32 (31.37%) shown in (figure 1)

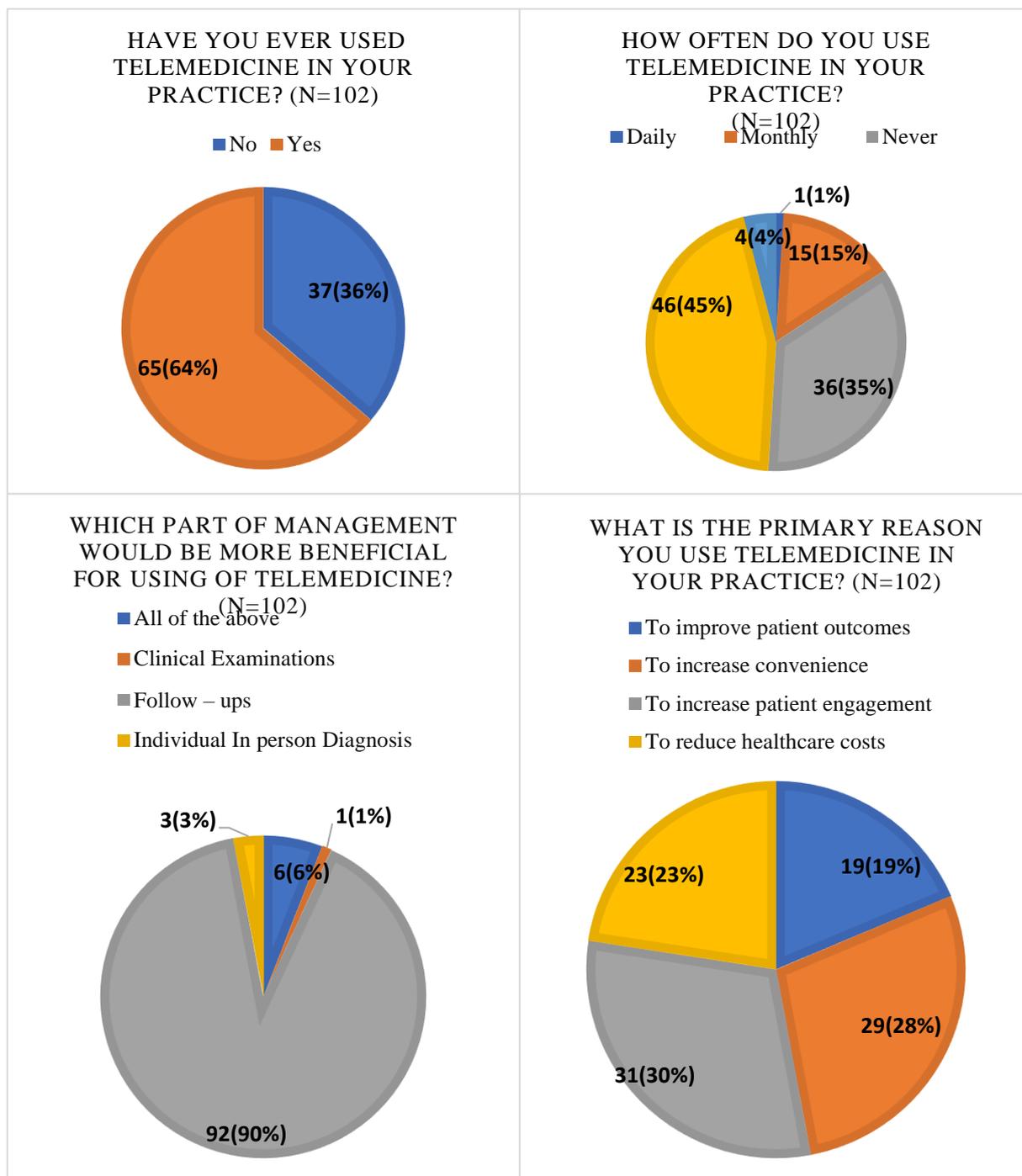


**Figure 1: Attitude about Telemedicine**

**Practice of Telemedicine:**

A majority of respondents, 65 (64%), indicated that they have incorporated telemedicine into their practice. In terms of how often it is used, the most frequent answer was rarely, with 46 (45%) participants, followed by never, with 36 (35%).

The main purpose for utilizing telemedicine was to enhance patient engagement, reported by 31 (30%) respondents, with increasing convenience being the next most common reason, selected by 29 (28%). Regarding the area of care where telemedicine is most valuable, a large majority of 92 (90%) identified follow-up appointments as the primary benefit as depicted in (figure 2).

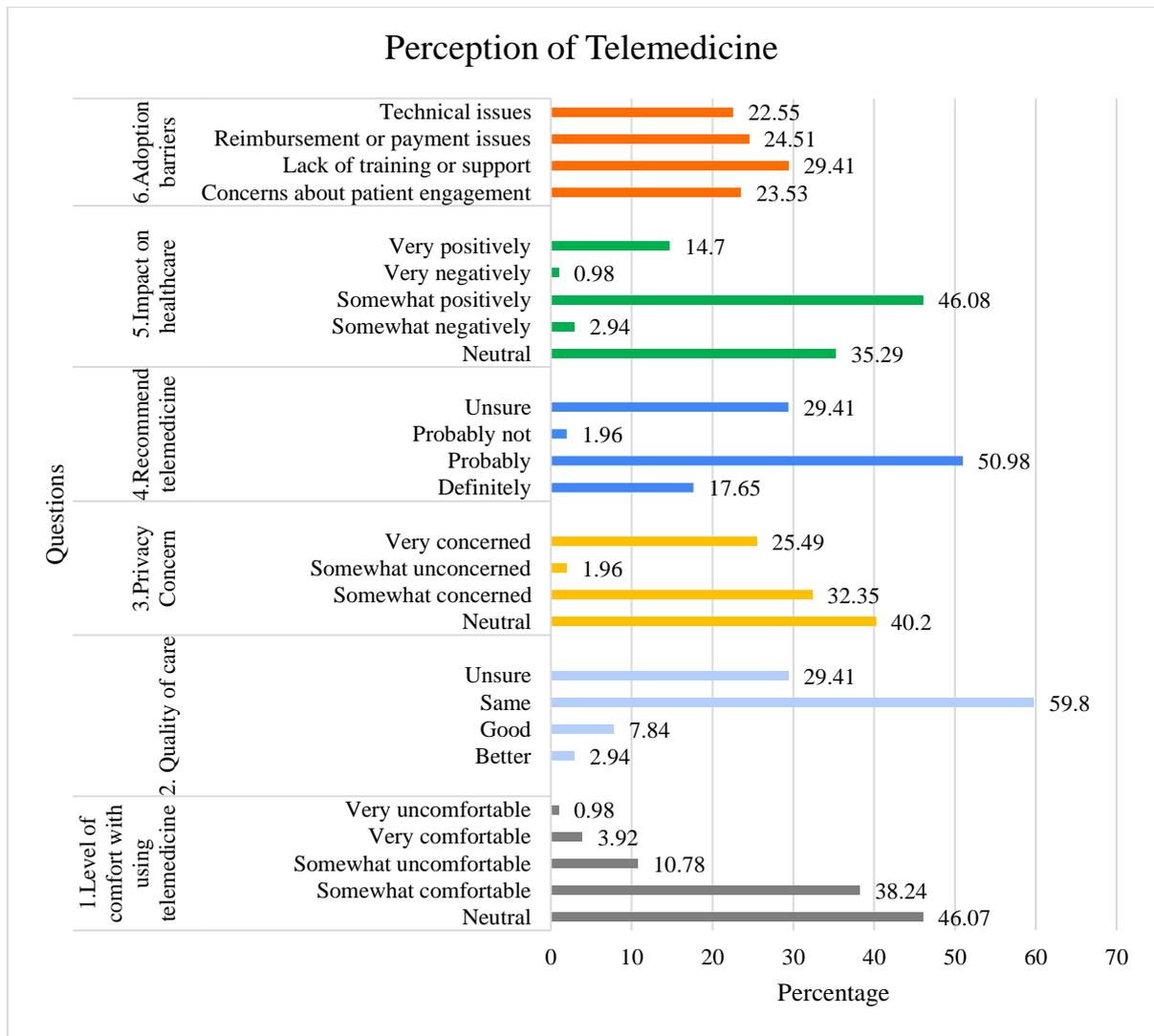


**Figure 2: Practice of Telemedicine**

**Perception of Telemedicine:**

The study results show that the perception of medical professionals about telemedicine a generally medium level of comfort, with 47 (46.07%) feeling neutral and 39 (38.24%) somewhat comfortable using it for patient consultations. Most participants, 61 (59.8%), perceive the quality of telemedicine to be the same as traditional in-person care, though 30 (29.41%) remain unsure. The study findings reveal that medical professionals have a moderate level of comfort with telemedicine, as seen by 47 (46.07%) neutral and 39 (38.24%) somewhat comfortable for using it for patient consultations. A majority of participants, 61 (59.8%), see the quality of telemedicine same as of conventional in-person treatment, while

30 (29.41%) remain unsure. For Privacy concerns about using telemedicine risks such as data breaches or technical issues, participants perceived that 33 (32.35%) somewhat concerned, 26 (25.49%) very concerned, and 41 (40.2%) neutral. Among them 70 (68.63%) would recommend telemedicine to colleagues, with 52 (50.98%) saying probably and 18 (17.65%) saying definitely. Regarding the future of healthcare, 47 (46.08%) believe that telemedicine will have a somewhat positively effect, 15 (14.7%) believe it as very positive, while 36 (35.29%) remain neutral. The primary barriers for adoption of telemedicine by medical professionals include lack of training or support 30 (29.41%), reimbursement or payment issues 25 (24.51%), concerns about patient engagement 24 (23.53%), and technical issues 23 (22.55%), which is shown in (figure 3).



**Figure 3: Perception of Telemedicine**

**DISCUSSION:**

Telemedicine is slowly becoming a part of improving localized, collaborative, evidence-based, and helpful healthcare in nations that are going through substantial changes in how medicine is done digitally. Telehealth is focused on health management and utilizes technology and telecommunications to preserve and promote health. It is an essential aspect of the expansion of telehealth.<sup>[7]</sup>

In developing countries, the healthcare delivery system has many problems that need to be addressed with careful and thorough solutions. Telemedicine is one promising option that could increase the overall quality and efficiency of healthcare services. To make sure that this technology can be utilized effectively and stays in place, it is important to spread the word, change people's minds, and teach healthcare workers practical skills linked to telemedicine at the community level. This proactive plan intends to make healthcare more accessible by using technology to its greatest advantage.<sup>[8]</sup>

A prospective, cross sectional observational study was conducted to determine the knowledge, attitudes, practice and perception concerning the use of telemedicine among medical professionals engaged in patient care at a tertiary care

teaching hospital. It observed that while these professionals acknowledged the many utilities and advantages of telemedicine, they also pinpointed significant barriers that restrict its use in areas with limited resources.

Among 102 participants 56(55%) were male and 46(45%) were female which is in accordance with study done by Vithalani A et al<sup>[8]</sup> where 53% were male. Most of the study participants were age between to 21-30 years of age 71(69.61%). Which is similar to study done by Alhadlaq R K et al<sup>[9]</sup> where the most of the study participants were median age 27 years. Among 102 participants largest proportion were 3rd Year Postgraduate Residents, comprising 21 individuals (20.59%), of all the specialties where the study done Alhadlaq R K et al<sup>[9]</sup> 38% were 3rd year post graduate residents. In this study the majority of participants 72 (70.58%), held an MBBS + MD/MS qualification. A study done by Nagraja et al<sup>[10]</sup> where major 68.9 % of the respondents held a MBBS qualification. Majority of the participants have < 5 years of experience 74(72.54%) while the study done by Younis et al<sup>[11]</sup> had <10 years of experience 437 (87.4%).

### **Knowledge**

88.23% report that wearable health devices (such as fitness trackers) are commonly integrated with telemedicine for remote patient monitoring in comparison to study done by Nagaraja VH et al.<sup>[10]</sup> 90.2% identifying video conferencing as the primary tool for remote consultations where 30.6% found on study done by Younis et al.<sup>[11]</sup> 95.09% identified it as a method of providing remote medical care, while in Fouad AA et al.<sup>[12]</sup> 84.8% identified as providing remote medical care, 88(86.27%) believe it reduces healthcare costs by limiting in-person visits in contrast to study done by Fouad AA et al<sup>[12]</sup> where 10(3.8%) believes that,83.3% note that limited access to high-speed internet is a major challenge while study done by Fouad AA et al<sup>[12]</sup> found 22.3% participants note that high-speed internet is major challenge. 93.13% emphasize use of secure, encrypted platforms for data protection in contrast to study done by Fouad AA et al<sup>[12]</sup> where 15.9% emphasize of encrypted platforms for data protection. Participants knowledge regarding telemedicine is satisfactory which is 91.18 Which is similar to study done by Fouad AA et al<sup>[12]</sup> were participants had highest level of knowledge about telemedicine.

### **Attitude**

Using telemedicine for managing chronic conditions 41.18% were neutral while study done by Jossy PE et al<sup>[13]</sup> where 53.3% agree that it facilitate diagnosis and treatment. Telemedicine is convenient in remote areas to be cost effective in compare to in person visit 31.37% participants were agree and strongly agree, while study done by Jossy PE et al<sup>[13]</sup> where 53.3% participants were agreed and 19.3% were strongly agree. 7.06% participants were neutral about telemedicine is convenient way to access the healthcare which is comparable with study done by Khan KL et al<sup>[14]</sup> where 64% participants were neutral about it. Concern about privacy protection 43.14% were neutral which is similar to study done by Khan KL et al<sup>[14]</sup> where 59% participants were concern about privacy protection. Preferring telemedicine for future 53.92% were neutral while in contrast to study done by Biruk K et al<sup>[15]</sup> were 60.1% participants were agreed about preferring telemedicine in future.

### **Practice**

64% indicated that they have used telemedicine into their practice which is similar to study done by Talmesany TA et al<sup>[16]</sup> where 54.9% participants have used. Majority of 90% identified follow-up appointments as the primary beneficial for telemedicine while study done by Talmesany TA et al<sup>[16]</sup> where 79.9% participants identified follow up appointments as primary benefit. Main purpose for utilizing telemedicine was to enhance patient engagement, reported by 30% participants, with increasing convenience being the next most common reason, selected by 28% while study done by Talmesany TA et al<sup>[16]</sup> where most of the participants reported main purpose for using telemedicine was save time (31.92%) followed by convenient to use (31.31%). In terms of how often it is used, the most frequent answer was rarely, with 45% participants which is contrast to study done by Mabu Shareef S et al<sup>[17]</sup> where 50% participants used weekly

### **Perception**

The study findings reveal that medical professionals exhibit a moderate level of comfort with telemedicine. Approximately 46.07% of respondents reported a neutral stance, while 38.24% felt somewhat comfortable using telemedicine for patient consultations. For instance, a Saudi Arabian survey reported that 43% of healthcare providers were comfortable with telemedicine, Alghamdi SM et al<sup>[18]</sup> Similarly, 59.8% in our study perceive telemedicine's quality as equal to in-person care, with almost 30% unsure mirroring the finding the study done by Alghamdi SM et al<sup>[18]</sup> 44% viewed telehealth as useful for quality and care delivery. When it comes to peer recommendation, 68.63% of participants indicated they would suggest telemedicine to colleagues-50.98% probably and 17.65% definitely. This mirrors results from other study done by Albaghdadi A T et al<sup>[19]</sup>,where over 90% of clinicians recommended telemedicine use. Regarding the impact of telemedicine in future of healthcare, 46.08% of respondents believed that telemedicine would have a somewhat positive impact, these findings aligns with AMA digital health care 2022<sup>[20]</sup>, where many practitioners believes telehealth as a permanent complement to traditional care, especially in post-pandemic healthcare models. The barriers for adoption of telemedicine identified by participants include lack of training or support (29.41%), reimbursement issues (24.51%), concerns about patient engagement (23.53%), and technical challenges (22.55%). These findings are widely supported by several studies [20-23] for structured training programs, reimbursement policies, and enhanced technical infrastructure.

### Limitations

Our research provides important information about medical professional's attitudes, knowledge, practices, and perceptions of telemedicine. Its limitations, however, include the fact that it was only carried out at one teaching hospital for tertiary care, which may limit the findings applicability to other healthcare settings, like private clinics and rural hospitals, where telemedicine exposure and resources may differ significantly. It's possible that the small sample size of participants doesn't adequately represent the majority of medical professional population.

### CONCLUSION:

In the study findings indicate that majority of healthcare professionals have satisfactory knowledge about telemedicine and acknowledge its potential to enhance healthcare delivery, their attitudes and practices shows moderate levels of comfort and utilization. Most participants recognize telemedicine have same potential as traditional care, particularly for follow-up consultations and chronic disease management. However, concerns regarding data privacy, limited access to internet to reliable technology, and insufficient training persist barriers to adoption of telemedicine. Despite the generally positive perception of telemedicine's role in the future of healthcare, its integration into routine clinical practice remains unsure. Thus, to combat this there is need for targeted interventions such as structured training programs, workshops, CMEs, improved technical support, and clear reimbursement policies to address the challenges and enhance the acceptance of telemedicine among healthcare providers.

### Conflict of Interest

No conflict of interest

### Financial support

No financial support

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