

## **EFFECTIVENESS AND PRACTICAL APPLICABILITY OF TELEDENTISTRY**

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### **INTRODUCTION**

There have been significant scientific advancements in the disciplines of medicine and dentistry since the introduction of telehealth technology years ago wherein advanced diagnosis, treatments, and surgeries can be undertaken.<sup>1</sup> This has great

potential to increase accessibility of healthcare in order to cut short the costs. Additionally, it might end the discrepancies in oral healthcare across rural and urban areas.<sup>2</sup> Teledentistry's range of practice involves fundamental assessment, thorough consultation, follow-up, and oral health awareness.

Asynchronous appointments, patient monitoring, synchronous or live visits, and mobile health are some of the different types of teledentistry that are used currently.<sup>3</sup> Several publications on the perspectives, efficacy, and uses of teledentistry at the international level have indeed been carried out in numerous nations. An overwhelming majority of dentists (80%) agreed about the positive outcomes of utilizing teledentistry for both dentists and patients, according to Estai et al assessments of perceptions of the dentists for the usage of teledentistry.<sup>4</sup> Similar findings were found by Canadian study by Palmer et al., in which most of orthodontists favoured using digital and electronic technologies in dental practice.<sup>5</sup> Despite the concerns about data protection and privacy, a recent survey study conducted in Saudi Arabia found that a significant portion of participants felt that teledentistry would benefit dental practice by boosting peer communication, providing guidance, and referring new patients.<sup>6</sup>

It is crucial for everyone to have access to sufficient, regular, and emergency medical and dental care, whether in developing or developed countries. Due to disproportionate distribution of dental professionals in urban areas, it is difficult for residents of rural and far flung areas to get services of trained medical/dental workers, especially oral health care specialists. Teledentistry is expected to reduce such types of issues of the distance between patients and qualified oral health care providers in rural and isolated locations.<sup>7</sup> There are a variety of challenges in receiving dental treatment in rural areas, including a poor provider-to-population rate, the expense of dental care, insufficient dentistry equipment, and the poor infrastructure.

The longer physical distances of dental clinics, scarcity of proper means of mobility, unawareness about oral health, geographic and cultural barriers to care and illiteracy are further difficulties. Due to this disparity in oral delivery of health care and accessibility between rural and urban locations, various strategies have been investigated, teledentistry being one of them. Very recently, it has been observed that during pre-COVID-19 era, majority of dental professionals had inappropriate knowledge regarding teledentistry; contrasting to this, attitudes toward the practice are now favourable among dental practitioners in the Pakistan.<sup>8</sup>

The use of teledentistry in Pakistan's healthcare system in the near future is encouraged by this rising trend because it will allow for safe dental care both during pandemics and afterward.<sup>8</sup> Moreover, the individuals could have quick access to early detection and intervention of their oral health difficulties in integration of teledentistry with oral health services.<sup>9</sup> The inappropriate diagnosis of oral lesions is one of the potential causes of the oral cancerous lesion's diagnosis being delayed and, in this context, teledentistry assists in the timely identification of malignant tumors, enabling quicker actions to manage oral cancer and improving the safety and effectiveness of the therapy.<sup>9,10</sup> In the background of this situation, this review study aims to get in-depth current evidence regarding the reliability, effectiveness and practical applicability of teledentistry.

## **MATERIAL AND METHODS**

This review paper was conducted by using the Preferred Reporting Items for Systematic Reviews and Meta Analyses (PRISMA) recommendations for transparent reporting of systematic reviews and meta-analyses. MEDLINE (PubMed), Scopus, The Cochrane Central Register of Controlled Trials (CENTRAL), Science Direct, Web of Science and Google scholar were systematically searched up to December 2022. Only the research items focusing on current evidence regarding the reliability, effectiveness and practical

applicability of teledentistry were eligible for inclusion. The original, full-text articles published in English, evaluating the reliability and effectiveness of teledentistry in the dental field, were chosen. All the unscientific commentaries, and news reports, letters to the editor, reviews, animal based studies, and reproduced articles were not included in this review. The focused question for this review was whether there is practical, reliable & effective applicability of teledentistry in the field of dentistry. The evidence based literature published up to December 2022 meeting the inclusion criteria was assessed. A search methodology was created in order to gather all scientific papers.

## **LITERATURE REVIEW**

Teledentistry offers the potential to increase accessibility to dental treatment, enhance how it is delivered, and reduce the associated costs. The gaps in oral health treatment between rural and urban groups may also be eliminated. Mahdavi A et al<sup>11</sup> conducted the study to analyze the availability of teledentistry facilities even during Covid-19 pandemic and to gain knowledge from various situations and 94 papers were collected, based on which the report's 15 articles about teledentistry during COVID-19 were drawn, and they observed that the delivery of dental services could be enhanced by teledentistry. To offer such services, especially in developing nations, a thorough planning and analysis of the situation is required. Moreover, additional research is required to fully understand the advantages of teledentistry and minimize its hazards and difficulties, both now and in the future.<sup>11</sup>

According to research by Duka M. et al<sup>12</sup>, the telemedicine-assisted diagnostic evaluation of the diagnostic techniques of third molars with impacts or semiimpacts was equivalent to clinical diagnosis evaluation in real time.

Subhan R et al<sup>13</sup> conducted a study to determine how Pakistani dentists feel and what they know about teledentistry as a new helpful tool. To assess dentists' understanding and perception of teledentistry, a self-administered, closed-ended, and revalidated questionnaire method with 21 items was delivered electronically by email, WhatsApp, and Facebook Messenger and the concluded that the Prior to COVID-19, the majority of dental professionals had appropriate knowledge of teledentistry, but attitudes toward the practice are now favourable among dental professionals in Pakistan. The use of teledentistry in Pakistan's healthcare system in the near future is encouraged by this rising trend because it will help ensure safe dental care both during pandemics and afterward.<sup>12</sup>

Maqsood A et al<sup>14</sup> carried out the study to evaluate teledentistry's influence, its use, and global trends for improving dental treatment and clinical practice. In their worldwide computerized survey the report identified the benefits of teledentistry. The standardized survey form had 26 questions in total, each with a response option on a 5-point Likert scale. The four sections of the questionnaire were: the value of this techniques for individuals, in dental practice, in enhancing current practice, and the issues associated with its use. The survey reported that the generally, dental practitioners' attitudes regarding teledentistry were favourable, and they showed a sufficient level of desire to integrate this modality into their clinical practices. Furthermore, teledentistry's incorporation into the system for oral health is significantly hampered by the perceived worries about it. To take full advantage of teledentistry, a thorough analysis of its business model and time-benefit requirements is required, especially in the context of poor countries.<sup>14</sup>

Aboalshamat KT et al<sup>15</sup> conducted a research to compare the accuracy of teledentistry used for diagnosis during the COVID-19 pandemic and conventional dental procedures among Saudi Arabian population in terms of reliability, perspectives, understanding, behaviors, and challenges. In their study the 70 participants were divided equally into the control and experimental groups by

randomization. The experimental group got teledentistry diagnoses whereas the control subjects waited for dental advise, and these were contrasted with baseline clinical exams obtained from the UQU dental facility in Makkah, Saudi Arabia. Following the intervention, all individuals responded to a survey and they observed that the teledentistry is extensively used and approved by study participants as a prerequisite followed by clinical examination for the most appropriate diagnosis. This is especially true during pandemic lockdowns or more common circumstances like inclement weather.<sup>15</sup> Giudice A et al<sup>16</sup> conducted a study to outline the benefits of telemedicine in dentistry practise within the present condition of national crisis brought on by the spread of Covid-19 and they observed that the consciousness of being continuously watched over and the sense of taking an active role in one's own recovery through teleconsultations have helped to promote patients' compliance and forge stronger doctor-patient relationships in the environment of government restrictions in emergency situation brought on by the spread of Covid-19

Mohammed Aljohani et al<sup>17</sup> conducted a study to evaluate TD's effect on Saudi Arabia's dental practitioners and its results, in their study to accomplish the goal, a thorough literature search was conducted using the most pertinent research published after year 2000. For research on TD and its effects on dental professionals, several databases, particularly PubMed, CENTRAL, and Scielo databases, were examined and they observed that in terms of practice and service, TD had a positive effect on dental practitioners. The potential impact of TD on dental professionals will be further improved and enhanced by new cuttingedge technical innovation.

Recently Omezli MM et al<sup>18</sup> conducted a study to investigate whether TD can give better oral care to those who need it in a way that is both feasible and acceptable. In their study for the purposes of the initial examination and video conference investigation was held. The surgeon who conducted the virtual examination also

scored it. A satisfaction survey was used to assess the participants' experiences concluding that the teledentistry technique could be a trustworthy and practical option in triaging and treatment planning by properly integrating the technology into clinical practice and removing obstacles to widespread implementation.

Wolf TG et al<sup>19</sup> in 2022 undertook a study regarding teledentistry as there are many uses for telemedicine that are being employed in patient care. Considering the application of this approach provision of oral health care in the areas of diagnostics, therapeutic, and rehabilitative services, in addition to decisionmaking advice by the physician over a spatial distance or possibly even a temporal offset, telemedicine utilises the information and communication technologies. Additionally, as telemedical techniques constitute a fundamental component of practically all medical or dental professions, the steering committee on telemedicine advises against representing telemedicine as an exclusively separate field. Consequently, the population's healthcare system should use the vocabulary of telemedical procedures.<sup>19</sup> A low-cost initial consultation for the patient in getting an expert opinion are further considerations. Enhancing interpersonal communications can also have benefits, such as getting second opinions or finding out whether health insurance or payers have approved a cost. In spite of being widely employed in medicine, teleradiology as being its important component has not yet been thoroughly established in dentistry.<sup>20</sup>

## DISCUSSION

In recent times, there have been numerous technological advancements in the dental industry. Digital computed tomography services, computers, telecommunications technology, gadgets all are now well advanced. According to modern information technology, the science of dentistry has expanded much further than it ever could.<sup>21</sup> New information technology has enhanced dental patient management quality while also enabling partial or full therapeutic

decisions tens of thousands kilometers distant from medical facilities or skilled dentists. In accordance to the current review observation the TD is proved as highly practically applicable with best effective tool in the dental filed due to modern busiest atmosphere. Consistently the review by Islam MR et al<sup>9</sup> reported that by offering teleconsultation help irrespective of time and space through advanced platforms, modern medical technology has made teledentistry a more helping means to reach patients on the larger scale. There is no substitute for teledentistry when it comes to reducing the strain on clinics during times of emergency and ensuring a safer patient consultation. Therefore, teledentistry is essential in providing patients with a dynamic management approach and best satisfies the needs of the patient's therapy. On the other hand endodontists, who are uncommon in rural regions of developing countries, specialize in a branch of dentistry known as endodontics. Endodontic services are available via teledentistry in these underdeveloped areas, indicating that expert dentists can assist junior colleagues in detecting root canal orifices by remotely identifying root canals.<sup>22</sup> It is possible to diagnose periapical lesions of the anterior teeth using teledentistry that uses the internet as a telecommunication medium, which lowers the expense of long-distance visits and makes emergency care more accessible.<sup>23</sup> There was no statistically significant difference in between capabilities of assessors to recognize periapical bone abnormalities using traditional radiographs on a view box and their ability to interpret the same images transmitted on a monitor screen by a video teleconferencing system. On the other hand Maqsood, A et al<sup>14</sup> in their study discussed that the in distant places that may be inaccessible owing to the lockdown scenario enforced by governments around the world, teledentistry can be especially helpful. Additionally, educating patients on their diagnosis and course of treatment is an essential component of their doctor visits. Teledentistry is a valuable technique for patient education, according to the majority of participants. These results are consistent with research in the literature showing that teledentistry can help educate patients as well as clinicians and dental students].



Depending on how they use it, several dental professions can employ teledentistry. In our study, we discovered that the most common uses of teledentistry were in periodontics, operative dentistry, and oral medicine.

This might be because more patients are seeking help.<sup>14</sup> The current study has several shortcomings. Firstly, the outbreak and use of teledentistry at local level has begun very recently; therefore, the available data in this regard is very scarce. Secondly the included studies of this review didn't evaluate other factors. This is a new kind of patient care that dentists are using to better manage their patients.

## CONCLUSION

This very important branch of telehealth is less frequently employed technique despite the fact that currently it is supported by evidence as a successful method for dental referrals, treatment planning and monitoring. For widespread teledentistry applications, asynchronous connectivity and the use of cellphones for picture capture are pre-requisites. It ensures the increased accessibility, effectiveness and care quality in a range of healthcare settings, including long-term care, hospitals, and rural clinics by virtual access to dental specialists. It is beneficial for both the general public and healthcare professionals, especially when face-to-face encounters are constrained.

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