SHORT RESEARCH ARTICLE

Teledentistry – A Multicentric Approach to Promote Oral Health Among Individuals with Cleft Lip and Palate in Rural Areas

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ABSTRACT

Teledentistry is a novel mode of promoting oral health care. It provides an opportunity for families living in remote areas to access timely/periodic oral healthcare. This approach aims to promote oral health in individuals with repaired cleft lip and palate (CLP) through teledentistry and evaluate its reach. A teledentistry model was implemented in a cohort of individuals with CLP from three rural areas. Teledentistry involved teleconsultations, telemonitoring, and tele education through real-time and mobile health methods from a tertiary care center. Over five months, 138 individuals with CLP were tele consulted, with 64 (46.3%) requiring dental treatment. Teledentistry successfully reached 138 individuals from rural areas, promoting oral health. This approach demonstrates the potential of teledentistry in increasing access to oral healthcare services for individuals with CLP in rural areas.

Keywords: Cleft lip and palate, Health promotion, Oral health, Teledentistry, Teleconsultation

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INTRODUCTION

Teledentistry, a combination of telecommunication and oral health, is an emerging modality of telehealth.[1,2] Teledentistry was first defined by Cook in 1997, 'as the practice of using video conferencing technologies to diagnose and provide advice about treatment over a distance.[3] Teledentistry utilizes electronic medical records, information and communication technology, digital photography and internet for the purpose of consultation, supervision, data collection, screening, health promotion and education and also facilitates triaging of patients to the most appropriate level of care.[1,4] Cleft lip and palate (CLP) is the most common congenital craniofacial disorder.[5] Individuals with CLP experience difficulty in maintaining good oral hygiene due to high prevalence and severity of malocclusion.[6,7]

Multidisciplinary management of patients with CLP should focus on prevention and early detection of common preventive diseases like dental caries.[8] Dental morbidities could be minimized by regular preventive and therapeutic dental care[7]. Telemedicine is an effective model for health education and treatment planning.[9] Teledentistry, a promising and effective strategy to increase oral health access in both rural and urban population.[1] Studies suggested teledentistry is suitable for both children and adults as it reduced anxiety in children.[1] A US based teledentistry project for remote populations, demonstrated cost-effectiveness compared to traditional referrals.[10] Improved clinical outcomes and consistently high satisfaction were reported following teledentistry.[11] Teledentistry models are equitable and cost-effective models,[1,3]. Literature reveal mid-level dental practitioners could screen dental caries using smartphone cameras, with costs lower than that of conventional face to face approach.[10,12,13] Teledentistry identified high risk populations, reduced waiting list, avoided unnecessary burdensome travel expenses, facilitated patient's referral to consultants and reduced loss to productivity.[14] Innovative teledentistry methods to identify Early Childhood Caries (ECC) at an early age is warranted to alleviate burden on dental professionals.[15]

Elective dental procedures were largely suspended during the COVID-19 pandemic, teledentistry remained an attractive, effectual, affordable and innovative solution.[16,17] The concerns about the limited oral health access for the underserved are persuading the healthcare professionals to adopt innovative health service delivery models.[1] Though in recent years, several successful teledentistry models have emerged, literature and data on utilization of teledentistry is still sparse.[1] Further teledentistry approach has not been reported in promoting oral health of individuals with CLP. This study aims to promote the oral health in individuals with repaired CLP through teledentistry and to evaluate the magnitude of its reach in promoting oral health.

METHODOLOGY

Ethical Approval: The protocol for this teledentistry approach, was approved by the Institutional Ethical Committee (Ref: IEC-NI/21/OCT/80/130).

Study Description: The current study on teledentistry service was a part of "Community Based Comprehensive Cleft Care (CCC) Project" funded through Transforming Faces (TF), a Canadian Charity Organization. The CCC project provides comprehensive care to individuals with CLP from Low and Middle-Income Countries (LMIC). The CCC project is a community driven model, and is being operated from the host institute located in southern part of India, since 2005. The project had 382 active individuals with CLP from low socioeconomic background from three different geographic locations (districts) in the state of Tamil Nadu, South India. Tiruvannamalai (1), Cuddalore (2) and Kanchipuram (3). A one-way journey from district 1& 2 to the tertiary medical centre that provided multidisciplinary care to individuals with CLP involved a travel of 4 to 5 hours by public transport, while district 3 required 1 to 2 hours. Prior to pandemic, the dental team travelled to these areas to provide preventive and therapeutic dental services to individuals with CLP. But with the onset of pandemic, the activities of the team were limited to the hospital due to the travel restrictions and COVID protocols.

Study Population and participant enrollment: The study included all individuals with CLP enrolled in the CCC project from 6 months of age, families with access to cellular phones, who provided consent and those who responded to telephonic calls. Participants who could not be contacted due to reasons like change of contact number or non-availability of network services were excluded. During teleconsultations parents accompanied their children, while adults and adolescents were teleconsulted independently.

Teledentistry Team: Oral health team of this teledentistry model included a general dentist, community- based rehabilitation (CBR) workers from all three districts, project executive, a dental assistant and three graduate students deputed on a rotational basis, one each from Department of Public Health Dentistry, Department of Paediatric and Preventive Dentistry - Centre for Early Childhood Caries Research (CECCRe) and from Department of Orthodontics and Dentofacial Orthopaedics. The team also included senior faculties as supervisors from the above-mentioned departments (Figure 1).

Orientation and Planning of Teledentistry Process: At baseline, the project dentist oriented designated CBR workers from all three districts on oral health & teledentistry activities via Google meet. Using the database from project administrative office, individuals with CLP/their families with access to smart phones were enrolled in a WhatsApp group to receive periodic updates and information from the

dental team. The contact details of those beneficiaries without the access to smartphones were maintained separately. An average of 2-3 teleconsultations were scheduled each day, in two stipulated time slots during forenoons and afternoons. Each call lasted for about 10-15 minutes. Exclusive time slots were allotted to review individuals with CLP undergoing orthodontic treatment.

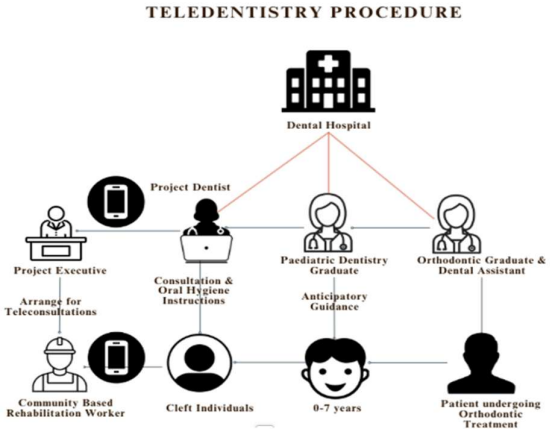

Figure 1: Teledentistry procedure

Teleconsultation and Telemonitoring Process: CBR workers and project executive scheduled teleconsultations. During teleconsultations, CBR worker facilitated at remote sites and project executive at the hospital recorded notes and managed other necessary logistics. The project dentist enquired the patient's dental complaints, history of past dental treatment and patient's oral hygiene habits. A raw oral examination was facilitated through the camera of a smart phone, followed by educational counseling and oral hygiene instructions. Individuals with incomplete or discontinued dental treatments were referred to tertiary centre for further treatment once normal operations were resumed. The graduate student from Pediatric Dentistry provided age-appropriate anticipatory guidance covering all the six domains namely oral development, oral hygiene, oral habits, fluorides, diet and nutrition and trauma prevention to the parents of children with CLP.

All individuals with CLP undergoing orthodontic treatment were reviewed via telemonitoring by the graduate student from Orthodontics providing the required instructions. Additionally, soft copies of intraoral photographs were requested from them for orthodontic consultant review.

Teleeducation: Oral Health Promotion (OHP) flyers were developed by the team in vernacular language (Tamil) emphasing the importance of primary dentition, etiology of dental caries, tooth brushing techniques, oral hygiene methods, myths and facts about CLP and possible problems encountered by individuals with CLP and their solutions. The OHP flyers were circulated in WhatsApp group.

Assessment of Outcome: Based on the selection criteria, a total of 138 individuals with CLP from three districts were identified for teleconsultation, of which 8 individuals were approached through voice call as they did not have access to smart phones (Table 1). The teleconsultations were carried out over a period of five months. The presence of dental morbidities was noted in custom made excel sheet.

Statistical Analysis: The data was entered in excel and statistical analysis was performed using Statistical Package for the Social Sciences (SPSS) version 23.0. Descriptive statistics summarized successful and unsuccessful teleconsultations, age, gender and presence or absence of dental morbidities. The presence of dental morbidities was expressed as numbers and percentage.

RESULTS

This teledentistry process helped in continuous oral health care of individuals with CLP during quarantine and lockdown.

Table 1: Distribution of study participants and mode of teleconsultation

District	Total enrolled CLP individuals (n = 382)	Total tele-consulted CLP individuals (n = 138)			
		Total (n = 138)	WhatsApp Call (n = 130)	Voice Call (n = 8)	CLP individuals with dental morbidities (n = 64)
Tiruvannamalai	183 (47.9)	50 (36.2)	49 (37.7)	1 (12.5)	19 (29.7)
Cuddalore	141 (36.9)	52 (37.7)	49 (37.7)	3 (37.5)	26 (40.6)
Kanchipuram	58 (15.2)	36 (26.1)	32 (24.6)	4 (50)	19 (29.7)

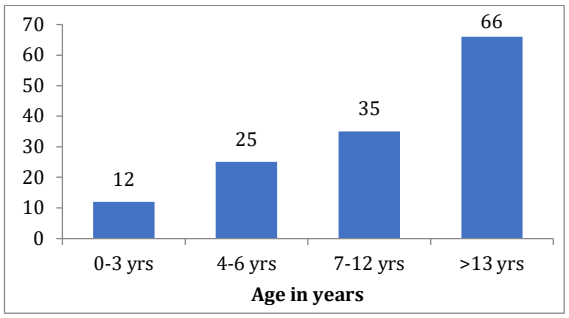

Figure 2: Age distribution of study participants

Figure 2, shows the age distribution of study participants. The mean age of those teleconsulted was 12.2 years with a standard deviation of 6.72.

Out of the 138 teleconsulted, 74 (53.6%) were males and 64 (46.3%) were females. Among those teleconsulted 18 (13.0%) were under regular orthodontic follow up. Various dental problems like multiple decayed teeth, missing teeth, and malocclusion which required referral to the tertiary health care facility was observed in 64 (46.3%), of which 35 (54.6%) were males and 29 (45.3%) were females. In remaining74 (53.6%) no dental problems were identified during teleconsultation. No acute symptoms, complaints or incidents were reported during teleconsultations.

Discussion

The present teledentistry approach was carried out to promote the oral health of individuals with CLP in rural areas. This process allowed reviewing the individuals with CLP, prioritizing appropriate treatments, and limiting unnecessary visits to oral health facility during the pandemic. Kancheepuram district which had the lowest number of teleconsultations reported the highest percentage of dental morbidities 52.7%, followed by Cuddalore (50.0%) and Tiruvannamalai (38.0%) districts. This helped us to prioritize dental treatments and schedule dental camps in Kancheepuram after the lockdown.

Antonarakis et al.[8] reported that dentists dealing with cleft patients should emphasise on frequent recalls and focus on oral health education and motivation for both the patients and their parents. Likewise, this approach enabled oral health education for individuals with cleft during pandemic when access to periodic dental screening at tertiary health centre or camps were unavailable. Teledentistry minimized unnecessary visits to oral health care facilities, reducing convenience charges and income loss for daily wage earners from low – income backgrounds. Screening via teledentistry enabled specialty consultations in remote areas and improved oral health. As majority of the families in rural areas had access to smart phones, this approach of teledentistry was a pocket friendly model.

Dental care in developing countries focuses on emergency rather than preventive care.[14] In contrary, this approach focused on primary prevention in individuals with CLP through oral health education. This teledentistry approach from a LMIC country in promoting oral health of individuals with CLP from rural areas stands unique, unlike the limited use of teledentistry by developing countries in areas of community health promotion and education as reported by Marino et al.[10]

In spite of its promising nature the study encountered a few limitations. This included network interruptions, inadequate technical knowledge to use android phones and biased responses from children and even adults when surrounded family members and neighbors during teleconsultations. As reported in literature that some people were apprehensive due to lack of face - to - face communication resulting in improper disclosure of their problems.[16] Further, limited visibility and accessibility prevented identification of incipient/ white lesions or any other initial lesions.

Future research should focus on creating awareness and knowledge of teledentistry among CBR workers/local health care providers to assist in remote screening. They must also be educated about the ethical and legal issues of using the data received from the patients. Teledentistry approach can also be extended to remote areas to screen pre-school children and promote oral health behavior in them. With the rapid development of telecommunication, teledentistry could be a better option for preventive care. It provides an opportunity to connect with dental practitioners and specialist across the globe. Though the use of teledentistry is increasing widely, there exist few barriers for its usage in remote and rural areas. Addressing these issues, teledentistry can expand oral health care services to those needed especially, individuals with CLP who require periodic dental care.

Conclusion

Teledentistry provided a viable alternative to continue services for individuals with CLP during the pandemic. By leveraging teleconsultations, telemonitoring, and teleeducation, the teledentistry model demonstrated the efficacy in promoting oral health and facilitating timely access to oral healthcare services in rural and remote locations. Over a period of five months, 138 individuals with CLP were successfully teleconsulted, with 46.3% requiring further dental treatment. The findings underscore the potential of teledentistry to bridge the gap in healthcare accessibility, ensuring continuous and comprehensive oral health care for vulnerable populations during the COVID-19 pandemic and beyond. Further research and investment in teledentistry could enhance its reach and impact, providing a sustainable solution for oral health care delivery in underserved communities.

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Availability of Data: The data that support the findings of this study are available on request from the corresponding author.

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Author contribution: SBP: Contributed to the concept, design, literature search, Data acquisition and manuscript preparation for the study. **AG**: Involved in the concept, design, intellectual content definition, and manuscript editing. **MSM**: Contributed to the concept, intellectual content definition and manuscript editing. **VK, SSC, SB:** Contributed to the concept, intellectual content definition, and manuscript editing. **GSR**: Contributed to the literature search and manuscript editing.

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