Use of teledentistry in pediatric dentistry in times of the covid-19 pandemic: literature review.

Uso de la teleodontología en odontopediatría en los tiempos de la pandemia de covid-19: revisión de la literatura.

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ABSTRACT

At the beginning of 2020, the virus that initiates COVID-19 emerges. Therefore, limitations were imposed on the interactions in the pediatric dental office. Teledentistry became an option to provide dental services to pediatric patients.

The purpose of this literature review was to determine the use of teledentistry in pediatric dentistry during COVID-19 pandemic.

A search was conducted on platforms such as: Ebsco, Scielo, Lilacs, Pubmed and Google Scholar regarding it. It was found that teledentistry was used for the purposes like as the diagnosis and promotion of oral health, measurement of knowledge of parents about children's oral health, to perform dental appliance checks, to measure the attitude and knowledge of teledentistry by the pediatric dentist and to carry out disease prevention and control in special patients.

OBJECTIVE:

The purpose of this literature review was to determine the use of teledentistry in pediatric dentistry in times of the COVID-19 pandemic.

METHODOLOGY:

The selection criteria included case reports, original articles and randomized clinical trials in Spanish or English published from 2020 to 2022. Articles other than Spanish or English were excluded.

The research question is: What is the use of teledentistry in Pediatric Dentistry in times of the Covid-19 pandemic?

- P= pediatric patients in need of dental care in times of the Covid-19 pandemic
- I= teledentistry
- C= not receiving dental care
- O= reduction in viral exposure of the pediatric patient during dental consultation, guidelines for dental care in times of pandemic, appropriate use of teledentistry in pandemic.

The article search strategy was conducted on platforms such as: EBSCO, Scielo, LILACS, Pubmed and Google Scholar.

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RESULTS:
It was found that teledentistry was used for diagnosis and promotion of oral health, to measure parents' knowledge of children's oral health, perform dental appliance checks, measure the attitude and knowledge of teledentistry by the pediatric dentist and to conduct prevention and control of diseases in special patients.

KEYWORDS:
teledendistry, pediatric dentistry, Covid, pandemic.

INTRODUCTION

In early 2020, health agencies reported a respiratory illness affecting the population of Wuhan, which was later identified as COVID-19 (WHO, 2020). This disease presented two variants: nCoV-2019 and SARS-CoV-2 (Chen et al., 2020).

In the field of dentistry, the primary modes of transmission are respiratory, particularly through salivary droplets produced during actions such as coughing, sneezing, or speaking. Aerosol transmission and contact with contaminated surfaces also contribute significantly to the spread of the virus (Gorbalenya et al., 2020).

Dentists are classified as a high-risk group due to several factors: airborne viral transmission during procedures (ALOP, 2020), the persistence of the virus in clinical settings (Golder et al., 2000), and frequent exposure to saliva, blood, and direct contact with patients' oral mucosa (Pen et al., 2020; Bizzoca et al., 2020).

To minimize these risks, teledentistry emerged as an initial preventive measure (Wax et al., 2020). This modality is part of the broader field of telemedicine.

The term "teledentistry" was first introduced in 1989 at a conference in Maryland, focusing on delivering dental care through dental informatics, telecommunications technology, electronic medical records, and digital images (Daniel et al., 2014).

Teledentistry encompasses various aspects of dental practice, including promotion, education, diagnosis, and rehabilitation (Sanchez et al., 2004).

There are two primary types of technology used in teledentistry: (i) synchronous technology, which involves live videoconferencing, and (ii) asynchronous technology, where images are stored and transmitted remotely for review by another practitioner (Skifas et al., 1997).

The American Academy of Pediatric Dentistry (AAPD) established protocols for managing dental care during the pandemic (AAPD, 2020).

Yang et al. emphasized the importance of distinguishing between emergencies and non-emergencies during online consultations and providing clear instructions to parents (Yang et al., 2021).

Despite its potential, the use of teledentistry in pediatric dentistry faces several challenges, primarily related to legal and ethical concerns (Castro et al., 2021).

This literature review aims to evaluate the use of teledentistry in pediatric dentistry during the COVID-19 pandemic.

No. 42, Vol I, 51-62 2025 (23) | ISSN2215-5740

METHODOLOGY

This review includes articles published between January 2020 and June 2022. A search was conducted on platforms such as EBSCO, Scielo, LILACS, PubMed, and Google Scholar.

Articles were selected based on keywords in both Spanish and English, including "teledentistry," "children," "pediatric dentistry," "oral health," and "COVID-19." Inclusion criteria included case reports, original articles, and randomized clinical trials published in Spanish or English.

The research question guiding this review was: What was the use of teledentistry in pediatric dentistry during the COVID-19 pandemic?

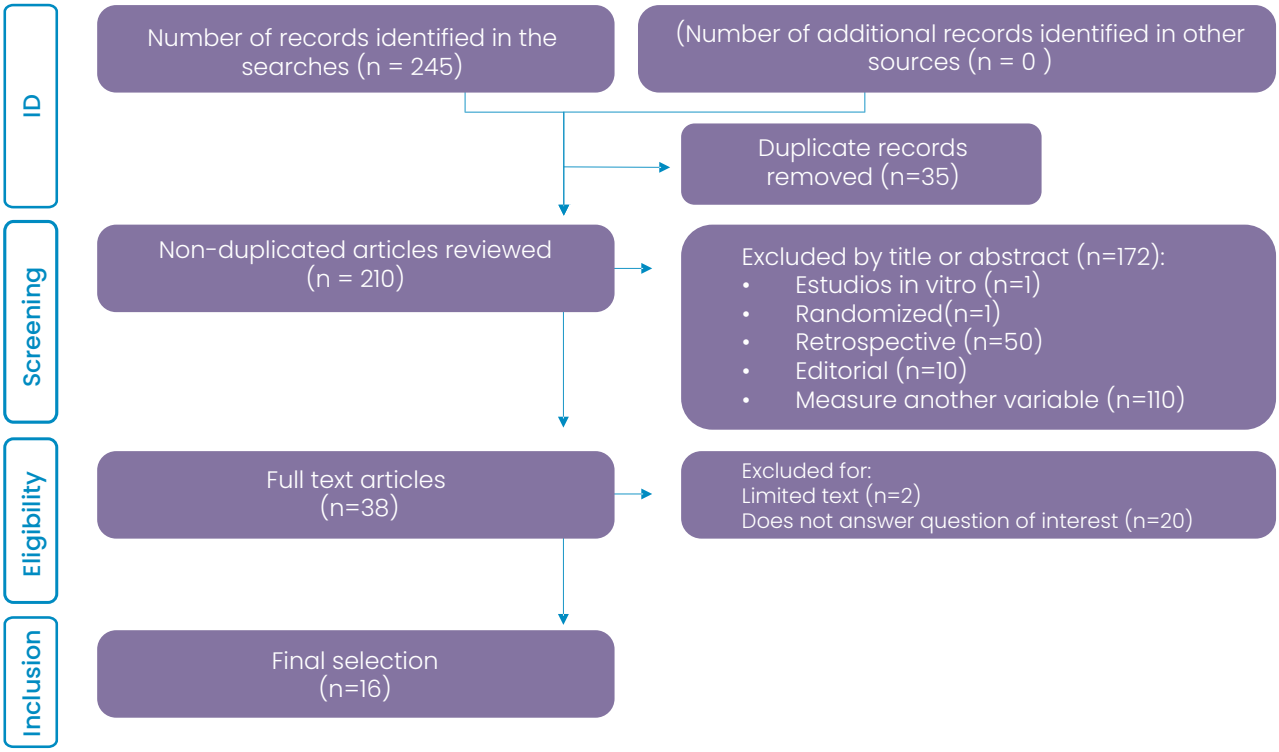

Figure 1 PRISMA flowchart "USE OF TELEDENTODYSTOLOGY IN PEDIATRIC DENTISTRY IN TIMES OF COVID-19 PANDEMIC: LITERATURE REVIEW"

General Objective:

To evaluate the use of teledentistry in pediatric dentistry during the COVID-19 pandemic.
Specific Objectives:

- 1. To identify the benefits of teledentistry during the COVID-19 pandemic.
- 2. To examine the limitations of teledentistry during the COVID-19 pandemic.
- 3. To explore how teledentistry has shaped new habits among the population during the pandemic.

No. 42, Vol 1, 51-62 2025 (23) | ISSN2225-5740

RESULTS

A total of 245 articles were initially identified. After removing duplicates (35 articles), 172 were excluded based on the abstract, and 22 articles were excluded due to lack of full text or relevance to the specific objectives. Ultimately, 16 articles met the selection criteria.

Teledentistry was applied in the following areas:

1. Diagnosis and Promotion of Oral Health in Children
Five studies focused on the diagnosis of dental diseases in children. Alshaya et al. (2022) assessed the accuracy of mobile phone cameras for diagnosing dental cavities and found that they were more reliable for detecting cavities in primary teeth than in permanent teeth.

Phone consultations allowed dentists to classify care needs based on the medical history and symptoms reported by the patient (Ilyas et al., 2021), reducing exposure to the clinical environment. The most common diagnoses were irreversible pulpitis and dental trauma (Simpsons et al., 2020).

In Newcastle, the pediatric dental service used phone calls to classify dental care needs and found that only 3% required urgent care (Wallace et al., 2021).

In China, surveys helped distinguish between dental emergencies and non-emergencies, facilitating appropriate referrals (Yang et al., 2020).

In addition to diagnosis, teledentistry facilitated oral health promotion. The "HI BOGI" app, developed during the pandemic, improved oral health knowledge among school-age children (Rina Putri et al., 2021).

2. Evaluation of Oral Hygiene and Dietary Habits
Teledentistry enabled dentists to investigate children's oral hygiene, dietary habits, and sociodemographic data (Alhayyan et al., 2020; Sun et al., 2020; Liu et al., 2021).

In a survey of 6–9-year-olds, it was found that the majority had poor oral hygiene and dietary habits, which contributed to increased dental discomfort, cavities, and gingivitis (Varkey et al., 2022). In Wuhan, caregivers reported improved attitudes toward children's oral health during the pandemic, with increased brushing frequency (Liu et al., 2021).

3. Pediatric Dentists' Attitudes and Knowledge of Teledentistry
A study in Austria revealed that only 10% of pediatric dentists had received training on teledentistry during COVID-19.

However, more than 40% expressed a desire for further education on the topic (Bekes et al., 2021). Nyodu et al. (2022) concluded that pediatric dentists were more knowledgeable about teledentistry than general dentists.

4. Disease Prevention and Management in Special Patients
Phone consultations helped identify oral health risk factors in special populations, such as children with Down syndrome and cleft lip.

A study identified factors like poor oral hygiene, high sugar consumption, and economic hardship as contributors to increased risk during the pandemic (Rojano et al., 2020; Viswanathan et al., 2022).

No. 42, Vol 1, 51-62 2025 (23) | ISSN2215-5740

Table 1 Studies using teledentistry for the diagnosis and promotion of oral health among children

Author's name and year	Sample	Method study	Method used	Summary
Ilyas N et al (2020)	102 patients (edad: 1-16)	Cross-sectional study	Structured online survey	The need for in-office treatment was classified after having suffered a trauma. Less than half were treated in the office. There were 55% of dentoalveolar injuries. The most frequent was a lateral dislocation.
Herawati H et al (2021)	1 patient (edad:8)	Case report	Video call	8-year-old patient. He is diagnosed with anterior crossbite. Tongue depressor therapy is performed via video call, achieving successful treatment.
Fadilah R.et al (2021)	143 students (edad: 6 – 12)	Cross-sectional study	Structured online survey and "HI BOGI" application	The level of knowledge about oral health is measured before downloading the "HI BOGUI" application, being at a moderate level. After downloading the application, the level is good.
Simpson S. et al (2020)	369 consultations (edad: 0-16)	Cross-sectional study	Structured survey (phone calls and in person)	The most common diagnoses were irreversible pulpitis and dental trauma. There was an increase in the incidence of trauma in anterior teeth due to the fact that children had greater recreational activity.
Wallace C. et al (2022)	653 patients (edad:0-16)	Cross-sectional study	Structured survey (phone calls)	Calls were classified according to their need. It was found that 3% needed urgent care, 15% required priority in-person care, and 21% were discharged.

No. 42, Vol 1, 51-62 2025 (23) | ISSN2225-5740

Alshaya M. et al (2021)	95 kids (edad: 5- 10)	Cross-sectional study	Cell phone photography with Iphone X	Intraoral photography in primary teeth was found to have excellent sensitivity and specificity. In permanent teeth it was good.
Fengjiao Y.et al (2020)	474 consultation (edad:0-18 años)	Retrospective study	Online survey	Analyzes the information of children's online dental health consultation during the COVID-19 pandemic in China, and provide methods to distinguish between dental emergencies and non-emergencies, as well as referral

Table 2 Studies using teleodontology as a tool to measure hygiene and feeding practices in children during the pandemic

Author's name and year	Sample	Method study	Method used	Summary
Li Z et al (2021)	1838 kids (age::6-13)	Cross-sectional study	Structured online survey	The 6-9 year-old group had greater oral discomfort, a high rate of dental caries and fracture of restorative material. Their eating habits and oral hygiene were poor.
Varkey IM et al (2022)	381 parents (age: 4-7)	Cross-sectional study	Structured online survey	48% of the population showed increased consumption of snacks during the pandemic. Only 28% of parents would take their child for dental treatment.
AlHayyan W. et al (2022)	583 caregivers (age:: 3-10)	Cross-sectional study	Structured online survey	91.5% of parents saw their children's oral health affected by the pandemic. 93% of caregivers used teledentistry during the pandemic period. 53.2% were unsure about teledentistry
Sun J. et al (2020)	148 parents (age:0-14)	Cross-sectional study	Structured online survey	A total of 91.89% of parents agreed that their child/children could become infected with the virus if they received dental treatment.
Liu C. et al (2021)	4495 parents (age:3-6)	Cross-sectional study	Structured online survey	96.9% of Wuhan residents reported higher frequency of tooth brushing compared to residents of other cities

No. 42 Vol I, 51-62 2025 (23) I ISSN2215-5740

Table 3. Studies that evaluated the attitude of pediatric dentists and knowledge of teleodontology

Author's name and year	Sample	Method study	Method used	Summary
Bekes K et al (2021)	58 dentists (93% women)	Cross-sectional study	Structured online survey	Only 10% were trained on the care they should take when caring for patients with Covid-19. 24% perceived general infection as very dangerous.
Nyodu T. et al (2022)	108 dentists	Cross-sectional study	Structured online survey	Structured online survey Knowledge and awareness about teledentistry and its use in the treatment of Early Childhood Caries are high among dentists who completed postgraduate studies, followed by postgraduate students..

Tabla 4. Studies that showed the prevention and control of diseases in special patients through teleodontology

Author's name and year	Sample	Method study	Method used	Summary
Rojano A. et al (2022)	15 families of patients with Down syndrome	Case report	Anticipatory treatment guidelines (Video call via WhatsApp)	A patient with Down syndrome was monitored for 3 months, with weekly consultations using the WhatsApp application. Risk factors for the oral health of the patient and her family were identified, such as: presence of dental biofilm, high sugar consumption, low frequency of brushing and limited source of income due to the COVID-19 pandemic, among others.
Viswanathan A. et al (2021)	208 patients with cleft palate (age: 1-16)	Retrospective study	Telephone calls	Effect of prioritizing dental care in patients with cleft lip during the COVID-19 pandemic, using the RAV classification (red/emergency, amber/urgent, green/ambulatory). 88% were classified as green, 3% were classified as red, which led to multidisciplinary care.

No. 42, Vol 1, 51-62 2025 (23) | ISSN2225-5740

DISCUSSION

The purpose of this study was to explore the applications of teledentistry during the pandemic and to identify the factors that either promote or limit its use, based on the perspectives of pediatric dentists, pediatric patients, and parents.

Teledentistry During the Pandemic
Teledentistry has proven to be a valuable tool during the pandemic, as it allowed for the identification of reasons prompting dental visits. Ilyas et al. (2021) found that 51 patients required emergency care during the pandemic, with dentoalveolar trauma being the primary cause.

In contrast, Simpson et al. (2020) reported that irreversible pulpitis and dental trauma were the leading causes of dental need among children.

One of the main limitations of teledentistry is its inability to resolve all cases requiring dental care. However, teledentistry can facilitate prescription issuance when clear infections are identified.

During the pandemic, teledentistry was particularly beneficial, as it enabled dentists to obtain an initial diagnosis of dental conditions in children. Telephone consultations, along with information provided by parents through surveys developed by various organizations, played a crucial role in classifying cases and determining whether an in-person visit was necessary or if a prescription alone would suffice (Yang et al., 2020; Ilyas et al., 2021).

Managing Pediatric Cases via Teledentistry
In pediatric dentistry, cross-consultation cases should be managed with an appropriate initial analysis. Key documents such as questionnaires, initial x-rays, and clinical photographs should be requested from the treating physician. Parents should also provide any additional relevant information (Mutis et al., 2018).

All documents must be stored in the patient's digital file, whether in virtual appointments or within the teledentistry record (ALOP, 2020).

High-quality intraoral and extraoral photographs are essential, and appropriate training in photography is required. In a study by Alshaya et al. (2022), high-end mobile phone photographs were found to be more reliable for diagnosing issues in deciduous teeth compared to permanent dentition, possibly due to the higher proportion of deciduous teeth in the sample.

Although intraoral photography is useful for diagnosing carious lesions, it has limitations in detecting treatments such as fissure sealants.

Impact of the Pandemic on Children's Oral Health
It was observed that younger children were more susceptible to cavities, likely due to changes in their eating habits during the pandemic, including an increase in snack consumption. Additionally, gingivitis observed in girls may have been caused by hormonal changes typical for their age, as well as stress related to the pandemic.

Changes in dietary habits during the pandemic have been identified as a major contributor to dental conditions (Alshaya et al., 2022). Alhayyan et al. (2022) found that 32.8% of parents identified diet as the main factor affecting their children's oral health, a finding consistent with Mallineni et al. (2021), who observed similar dietary changes in most Brazilian families.

No. 42, Vol I, 51-62 2025 (23) | ISSN2215-5740

Oral Hygiene Practices During the Pandemic In Wuhan, the fear of COVID-19 led many parents to improve their children's oral hygiene practices. Residents of Wuhan demonstrated an increase in brushing frequency compared to other cities in China, likely due to the severity of the pandemic.

Similar improvements were observed in cities in Italy, which faced a similar level of COVID-19 severity (Spinazze et al., 2020). This shift in parental behavior may also reflect concerns about the risk of COVID-19 transmission in dental offices. Parents perceived the dental environment as more dangerous than other public spaces and, as a result, were more likely to seek dental care only if their children experienced severe pain (Sun et al., 2020).

Lack of Preparedness Among Pediatric Dentists The lack of knowledge regarding the risks associated with COVID-19 affected not only parents but also pediatric dentists. Bekes et al. (2021) found that only 27.6% of pediatric dentists felt adequately prepared to address the challenges posed by the pandemic. This lack of preparedness may be attributed to insufficient training, particularly for those working in the private sector.

Similarly, Putrino et al. (2020) observed that only a small number of dentists had received specific COVID-19 training. Teledentistry as a Tool for Expanding Access to Care The rise in COVID-19 cases disrupted access to pediatric dental appointments. In light of this, teledentistry emerged as a valuable tool for providing preventive dental care, helping to expand pediatric care capacity.

Pediatric Dentists' Knowledge of Teledentistry Nyodu et al. (2022) concluded that pediatric specialists have a greater mastery of teledentistry compared to general dentists. This finding aligns with the study by Ata and Ozkan (2009), who also noted that general dentists had lower awareness of teledentistry than specialists.

Expanding Dental Services Through Teledentistry Teledentistry offers the potential to expand dental services and improve access, particularly for special patient populations. In the future, it is expected that this modality will allow more patients to participate in activities led by dentists, facilitated by the availability of advanced equipment, economic resources, and fast communication networks.

For example, Yuen et al. (2009) demonstrated the use of video conferencing to provide care to patients with physical and motor limitations, as well as older adults. Effective Communication in Telehealth Visits Effective communication is crucial during telehealth visits. It is essential to maintain a welcoming, calm, and reassuring tone of voice (Truppe et al., 2011). The first step is to reassure the patient and their caregiver, guardian, or legal representative, and provide a brief explanation of the scope, benefits, and responsibilities of the telehealth appointment. The practitioner should listen attentively, demonstrate empathy, and update the patient's medical record with the information provided (ALOP, 2020).

CONCLUSION

Teledentistry offers an effective strategy for diagnosing, treating, and managing pediatric dental issues during the pandemic. It is an alternative that can reduce patient exposure to COVID-19 and improve dental health outcomes for children. Further research and training are necessary to optimize its integration into routine pediatric dental care.

No. 42, Vol 1, 51-62 2025 (23) | ISSN:2225-5740

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The authors declare that they have no conflicts of interest.

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No. 42, Vol 1, 51-62 2025 (23) I ISSN:2225-5740

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