



Effect of COVID-19 pandemic on children's oral health services: A cross-sectional study

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Abstract

Objective: Restrictions of face-to-face visits to children due to the prevalence of COVID-19 infection have had adverse effects on oral health-related complications. This study aimed to evaluate the effect of the COVID-19 pandemic on the accessibility of children to oral health services.

Methods: In this descriptive-analytical study, a specific questionnaire was prepared to evaluate the views of pediatric dentists about the impact of COVID-19 on providing oral health services. The questionnaire was dispersed to a target population of 136 pediatric dentists. To evaluate the content validity of the questionnaire, content and face validity methods were used, and Cronbach's alpha coefficient was calculated using IBM SPSS statistical software, version 15

Results: The final questionnaire was prepared with 23 questions and a Cronbach's alpha of 0.92. Most participants stated that the number of children referred for routine checkups, child cooperation on dental units, no referrals due to economic problems, diagnosis of bruxism and clenching, fissure sealant, dental restorations, fluoride therapy, and preventive orthodontics had a statistically significant decrease during the COVID-19 era. Moreover, using mouthwash, toothbrush and floss, long chair side treatments, treatment of children under anesthesia, pulpotomy and pulpectomy, and chronic gingival infection did not change significantly during the COVID-19 pandemic. During the COVID-19 period, there was a statistically significant rise in plaque buildup, tooth extraction, toothache, using snacks, and acute gingival infection.

Conclusions: Referrals for non-emergency and preventative treatment procedures have decreased during the COVID-19 pandemic, but referrals for emergency measures have increased.

Keywords: COVID-19; Pediatric; Oral health; Pediatric dentists

1. Introduction

The growing prevalence of the new Coronavirus 2019 has challenged global public health (1). COVID-19 first emerged in December 2019 in Wuhan, China, and spread rapidly on a pandemic scale worldwide (2). On February 11, 2020, the WHO1 nominated the disease as COVID- Corona Virus 2019 (COVID-19) (3, 4). Towards the end of December 2019, the World Health Organization (WHO) introduced the infection caused by the virus as a global emergency (5).

Oral health plays a crucial role in public health promotion and is one of the important slogans of the 21st century (6). Poor oral hygiene can affect public health, life quality, and development in children (7). On the other hand, oral problems adversely affect people's social life and physical condition and are associated with chronic diseases such as diabetes

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mellitus and mortality (8). Oral diseases are among the most common chronic diseases due to their prevalence and impact on individuals. Their treatment costs are considered important issues in public health (9). Oral diseases not only affect different aspects of children's lives but also influence their family members (10). COVID-19 outbreak caused serious changes in children's lifestyles, quarantine at home and social isolation. This lifestyle led to cessation of physical activity and some changes in children's normal lifestyles (11). Although COVID-19 has affected various aspects of children's lives, including vaccination, education, personal and social conditions, and little attention has been paid to oral health as a prospect of the child's health. The Centers for Disease Control and Prevention (CDC) recommended stopping daily care and non-emergency dental care. Patients should only seek emergency care for essential clinical treatment (March 25, 2020). As a result, infants and children who were eligible for their first dental visit could not attend their routine dental care (12) and their oral health is significantly endangered (13). This reduction in visits could increase long-term oral health-related complications (14).

In general, limited measurement tools have been designed to evaluate the impact of risk factors on pediatric orthodontic diseases (10). The present study aimed to design a researcher-made questionnaire to assess the impact of the COVID-19 pandemic on children's oral health services.

2. Material and methods

This was a descriptive-analytical study designed using an observational method to examine the view of pediatric dentists about the effects of COVID-19 on accessibility to oral health services in 2021. Content and face validity methods were used. First A preliminary questionnaire was prepared by studying books, magazines, domestic and foreign publications, electronic databases, and consultation with pediatric dentistry supervisors and consultants. In the second step both qualitative and quantitative methods were used to evaluate the content validity of the questionnaire. The questionnaire was distributed among ten pediatric dentists by mobile application (such as whatsapp) and was evaluated in terms of content validity. Items that were not agreed upon were modified to reach an agreement. In the qualitative method, grammar, use of appropriate words, placement of items in their proper place, and proper scoring were examined by experts. In the third step to evaluate the questionnaire's content quantitatively, the content validity ratio (CVR) and content validity index (CVI) were calculated. To calculate the content validity ratio, ten pediatric dentists were asked to rate each question on a three-point Likert scale of "necessary", "useful but unnecessary", and "unnecessary". Then the answers were then calculated based on the following CVR formula:

$$CVR = \frac{n_E - \frac{N}{2}}{\frac{N}{2}}$$

In the above formula, n_E is the number of experts who answered the necessary option, and N is the total number of experts. Hence, the formula calculated the CVR value and compared it with the corresponding value. If the calculated CVR was larger than the table CVR, the content validity of the item was verified (15).

To calculate the content validity index, three simplicity, specificity (relevance), and clarity criteria were reviewed separately on a 4-point Likert scale (1: unrelated, 2: somehow relevant, 3: relevant, and 4: completely relevant) for each item by ten experts. For this purpose, the CVI score was calculated by summing the agreeing scores for each item that ranked third and fourth (highest score) on the total number of specialists using the following formula. CVI above 0.78 was considered as acceptable (16). In this formula, n_E is the sum of the number of specialists who gave a score of 3 and 4 to each item, and N is the total number of specialists.

$$CVI = \frac{n_E}{N}$$

Face validity was assessed both quantitatively and qualitatively. The designed questionnaire was sent to 10 pediatric dentists in addition to the panel of experts to comment on the diction of the questions. The qualitative face validity assessed the difficulty, disproportion, and ambiguity. In the next step, the quantitative effect of items was used to eliminate improper items and determine the importance of each item. Thus, based on the importance of items to estimate the study's main aim from the visual perspective, each item was scored using a 5-point Likert scale. Score 1 shows the lowest, and score 5 indicates the highest importance. The impact score for each item was calculated by multiplying the importance of an item by the number of repetitions (the percentage of those who gave a score of 4 or 5 for each item was multiplied by the average score obtained for each item). An impact greater than 1.5 was considered appropriate (15). To evaluate the reliability of the tool, the final questionnaire was given to 136 pediatric dentists through porline online questionnaire (Supplementary file 1). E-mail or contact number of pediatric dentist was found

through social networks. The questionnaires were completed, and the internal correlation was calculated using Cronbach's alpha coefficient. The alpha level above 0.7 was considered significant. The research project was approved by the Ethics Committee of the dentistry school of the Tehran University of Medical Sciences (IR.TUMS.DENTISTRY.REC.1400.024). However, the content validity score should have been at least 0.78 for the questions added to the questionnaire. Therefore, questions 2 and 7 were removed due to not getting a satisfactory score. Question 23 was examined to determine the reliability, and the results showed that the reliability of the questionnaire using Cronbach's alpha coefficient was 0.92 and thus reliable.

3. Results

Table 1 The questionnaire validity test, content validity index, content validity ratio, and quantitative face validity of the questionnaire questions

Question number	quantitative face validity	content validity ratio (CVR)	Table 1: Content validity index (CVI), content validity ratio (CVR) and quantitative face validity of the questionnaire questions		
			Content validity index (CVI)		
			Related	Clarity	Simplicity
1	4.6	0.8	1	1	1
2	5.00	-0.8	0.1	0.6	0.6
3	4.8	1	1	1	1
4	5.00	1	1	1	1
5	5.00	1	1	1	1
6	5.00	0.8	0.9	0.9	0.9
7	4.4	-0.6	0.2	0.8	0.8
8	5.00	0.8	0.9	0.9	0.9
9	4.6	0.6	0.8	0.9	0.9
10	5.00	1	1	1	1
11	5.00	1	1	1	1
12	5.00	1	1	1	1
13	5.00	1	1	1	1
14	4.8	1	1	1	1
15	4.8	1	1	1	1
16	5.00	1	1	1	1
17	5.00	1	1	1	1
18	5.00	1	1	0.9	0.9
19	5.00	0.6	0.9	0.9	1
20	4.8	1	1	1	1
21	4.6	1	1	1	1
22	5.00	0.6	0.8	0.8	0.8
23	5.00	0.6	0.8	0.8	0.9
24	5.00	0.8	0.8	0.9	0.9
25	4.8	0.8	0.8	0.9	1

The questionnaire was prepared by studying books, magazines, domestic and foreign publications, electronic databases, and consultation with pediatric dentistry supervisors and consultants. The questionnaire validity test, content validity index, content validity ratio, and quantitative face validity of the questionnaire questions are summarized in Table 1. The results showed that all questions in this area were acceptable to determine the importance of each item in fulfilling the primary purpose of the study, considering that the minimum quantitative face validity was 1.5.

The number of children referred for routine dental check-ups (p-value<0.001), child cooperation on the dental unit (p-value = 0.004), non-referral due to economic problems (p-value = 0.001), diagnosis of bruxism and clenching (p-value = 0.001), placement of fissure sealant (p-value = 0.001), dental restorations (p-value = 0.001), fluoride therapy (p-value = 0.001), preventive orthodontic treatments and orthodontic follow-up (p-value = 0.001) have had a statistically significant decrease during the COVID-19 pandemic.

Contrary, mouthwash usage rate (p-value = 0.529), toothbrush and floss (p-value = 0.455), long chair side treatments, treatment of children under anesthesia (p-value = 0.001), pulpotomy (p-value = 0.518) and pulpectomy (p-value = 0.357), chronic gingival infection (p-value = 0.001) and stainless steel crown treatment (p-value = 0.272) have not changed statistically significantly in the COVID-19 pandemic. Nevertheless, plaque and calculus accumulation (p-value = 0.001), tooth extraction (p-value = 0.001), toothache (p-value = 0.001), consumption of harmful snacks and sweets (p-value = 0.001) and acute gingival infection (p-value = 0.001), have had a statistically significant increase during the COVID-19 pandemic (Figure 1).

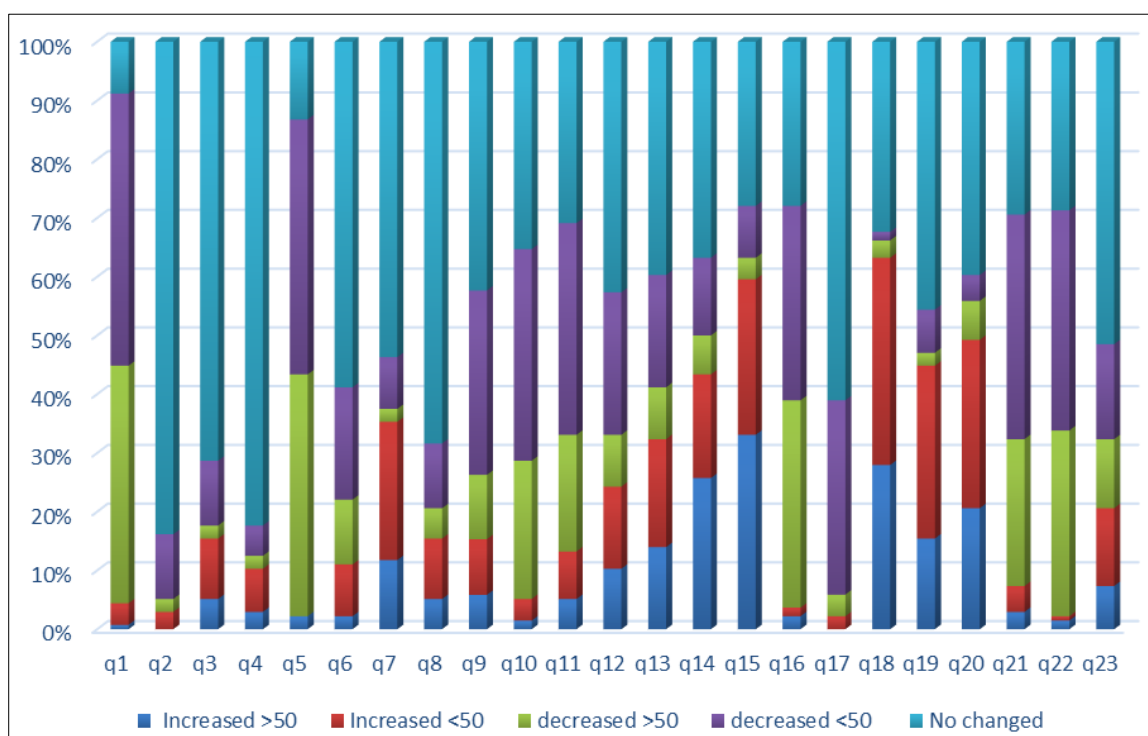


Figure 1 Frequency distribution chart of the participants' answers to the questionnaire questions. (The q1 to q7 are related to demographic data and the q8 to q23 s are related to the questionnaire (supplementary file))

4. Discussion

Based on the present study results, the rate of referrals of children with acute toothache, non-referral due to economic problems, and reduced income during the COVID-19 pandemic have increased compared to the past, which is consistent with the study by Chan et al. (17). During the COVID-19 pandemic, most businesses were shut down to prevent the spread of the virus, leading to job losses, declining incomes, and economic hardships, which resulted in increased expenses for parents of In this regard, a questionnaire was designed and used according to the experiences of children's dental specialists as well as the studies conducted in this field (18).children. Based on the present study results, the consumption of sweet snacks increased during the COVID-19 pandemic period, which is consistent with the study of Ricardo et al. as they stated an increase in food consumption (19). Quarantine has led to an increased tendency to consume snacks and sweets during the COVID-19 pandemic. Jansen et al stated that higher COVID-19-specific stress

was also associated with greater child intake frequency of sweet and savory snacks, with some evidence for mediation by snack parenting practices (20).

Moreover, we have found a decrease in dental fluoride therapy during the COVID-19 pandemic era, which is consistent with other studies in this field. Mayer et al. reported that pediatric dental fluoride therapy was significantly reduced compared to before the pandemic (21). It appears that fear of COVID-19 and closing elective dental practice centers have reduced patients' admission and, consequently, the demand for fluoride therapy. The study of Chang et al. (17) is consistent with the present study results, as stated that the number of children referred for routine dental examinations was decreased. In this study, the results indicate a decrease in referrals for dental examinations. Fear of COVID-19 and declining parental income seem to be the main reasons. Dentists and oral healthcare provider can have an important role in early detection of COVID-19 (22), using mouthwashes can decrease the chance of transmission of COVID-19, specially using chlorhexidine mouthwash (23,24). Although, COVID-19 impacted oral and maxillofacial region and treatments, such as effect of COVID-19 vaccines on dermal fillers (25) or secondary infections such as mucormycosis (26).

Moreover, in the present study, mouthwash and floss and the accumulation of plaque and calculus on the teeth have not changed compared to before the pandemic, which is contrary to the study of Chang et al. (17). Chang et al. reported that oral health behavior improved in children of Wuhan who were infected with COVID-19 and quarantined and were more active in maintaining oral health than non-Wuhan children who were not yet infected.

Another topic discussed here was the pediatric orthodontic follow-up. Our study showed that follow-up for orthodontics during the COVID-19 period was decreased. The study of Noor Bostani et al. is also consistent with this study that the COVID-19 pandemic period has had a significant impact on orthodontic treatment, and orthodontic patients did not attend their orthodontic appointments (27). It seems that children do not attend their orthodontic appointments because of their fear of getting COVID-19 infection.

The present study results showed that there had been an increase in the number of children with gingival infections, which is in contrast to the study of Taim et al., as the most common pediatric dental emergencies in the COVID-19 period were issues related to dental roots (28). In addition, in the study of Petreso et al., the most emergency cases of referrals were gingival infections (29). It seems that closing dental centers, lack of referrals except for emergencies, and lack of routine dental examinations have increased the incidence of oral infections. This study is consistent with Valentin et al., as referrals for dental restoration and fissure sealants decreased (30). Due to the non-emergency nature of dental restorations and the closing elective dental centers, a decrease in referrals for dental restorations is not unexpected. Reduction of pediatric dental treatments during COVID-19 pandemic was reported in the other studies by Chisini et al. (31) and also Malineni et al. (32). Considering the novelty of the COVID-19 pandemic and the effect that vaccination has had on its spread, it is suggested to perform similar studies in different research environments with a higher number of samples to vaccinate children in different research environments. It is also recommended to hold educational programs to improve parents' information for preventive dental measures and reassure parents that their children would not get COVID-19.

5. Conclusion

During COVID-19 pandemic Reduction of pediatric dental treatments was reported. Considering the impact of COVID-19 pandemic on children dental health, vaccination and control of pandemic was a critical issue in children's health.

Compliance with ethical standards

Disclosure of conflict of interest

There is no conflict of interest.

Statement of ethical approval

The study has been approved by ethical board of Tehran university of medical sciences, with the code of IR.TUMS.DENTISTRY.REC.1400.024.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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