http:// ijp.mums.ac.ir
Original Article (Pages: 18433-18439)

Frequency of Asymptomatic COVID-19 Children and Related Oral Manifestations in 4-12-Year-Old Pediatric Dental Patients

Maedeh Razaghi [1], Katayoun Salem [2],* Sara Zahedirad [2]

[1] Dentist.

[2] Assistant Professor of the Department of Pediatric, Faculty of Dentistry, Tehran Medical Sciences, Islamic Azad University, Tehran. Iran.

Abstract

Background: This study aimed to assess the frequency of asymptomatic coronavirus disease-2019 (COVID-19) carriers and related oral manifestations in child dental patients.

Methods: This cross-sectional study was conducted on 215 asymptomatic pediatric dental patients aged 4-12 years. Clinical examination was performed by one calibrated examiner to determine oral signs and symptoms between October 2021 to July 2022. After completing clinical examination, the participants underwent a COVID-19 polymerase chain reaction (PCR) test. Data were analyzed by Chi-Square, T- test, and Fisher's exact test ($\alpha<0.05$).

Results: The mean age of the patients was 7.71±1.74 years; 102 (47.4%) were males and 113 (56.6%) were females. Thirty-two patients (14.9%) had a positive PCR result for COVID-19. Out of 32 positive subjects, 7(21/9%) had oral lesions including aphthous and herpetic ulcers. Impairment in the sense of taste was not observed in any of the patients. Association between oral symptoms, and age (P=0.432) or gender (P=0.539) was not significant.

Conclusion: The prevalence of COVID-19 asymptomatic carriers in the study population was 14.9%; and 3.3% of them had oral manifestations, which emphasizes the need for personal protective equipment to prevent infection transmission.

Key Words: Covid-19, Oral Manifestations, Pediatric Dental Patients.

* Please cite this article as: Razaghi M, Zahedirad S, Salem K. Frequency of Asymptomatic COVID-19 Children and Related Oral Manifestations in 4-12-Year-Old Pediatric Dental Patients. Int J Pediatr 2023; 11 (12):18433-18439. DOI: **10.22038/ijp.2023.76191.5390**

****Corresponding Author:***

Sara Zahedirad, Assistant Professor of the Department of Pediatric, Faculty of Dentistry, Tehran Medical Sciences, Islamic Azad University, Tehran. Iran. Email: szahedirad@ymail.com

Received date: Nov.13,2023; Accepted date: Dec.27,2023

1- INTRODUCTION

The World Health Organization declared coronavirus disease 2019 (COVID-19) pandemic in March 2020. COVID-19, caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is an acute respiratory syndrome characterized by a usually asymptomatic but potentially life-threatening bilateral pneumonia (1). The main routes of virus transmission include air and direct contact. Airborne virus transmission occurs through droplets spread by coughing, sneezing, exhalation, or speaking of an infected person. Infection can be transmitted by contacting the infected surfaces and subsequent touching of the eyes, nose, or mouth. Saliva also plays an important role in infection transmission through the airways and direct contact (1).

Asymptomatic or mildly symptomatic patients pose a significant challenge to pediatric dentistry (2, 3). The prevalence of COVID-19 in children is reportedly lower than that in adults, and infected children usually show fewer signs and symptoms. However, children can transmit SARS-CoV-2 (2, 4). A study on children with COVID-19 in China reported that 90% of infected children had no or mild symptoms (5). Another study conducted in Turkey reported that 22.7% of COVID-19 children were asymptomatic (6). Thus, even asymptomatic children may be infected with SARS-CoV-2 and may transmit the disease to healthcare workers (7).

It has been reported that virus transmission through asymptomatic individuals accounts for over 50% of all virus transmissions (7). Thus, aside from screening and isolation of symptomatic COVID-19 patients, risk of disease transmission from asymptomatic patients should be emphasized.

Oral manifestations of COVID-19 are variable and may include ulcers, blisters, vesicles, pustules, fissured or papillated tongue, macules, papules, plaques, pigments, halitosis, white patches, hemorrhagic patches, necrosis, petechiae, swelling, and erythema. The most common sites of involvement include the tongue (38%) followed by the labial mucosa (26%), and the palate (22%). Oral lesions often equally occur in males and females (8).

Currently, most children are at risk of COVID-19 since they have not received any vaccination for COVID-19 (9). Also, adherence to hygienic and preventive measures is difficult for children and they less understand the benefits of such precautionary measures. All these factors can make the children more susceptible to COVID-19. On the other hand, postponing dental care is associated with caries progression and dental infection, with possible adverse effects on permanent dentition. Thus, since dental care is imperative for children, risk of COVID-19 transmission in the process of treatment should be minimized.

Considering the gap of information regarding the frequency and oral manifestations of asymptomatic patients among children in Iran, and the significance of minimizing cross-infection from asymptomatic children to dental staff, this study aimed to assess the frequency of COVID-19 carriers and related oral manifestations in 4-12-year-old pediatric dental patients.

2- MATERIALS AND METHODS

This cross-sectional study was conducted on 4 to 12-year-old pediatric dental patients presenting to the Pediatric Dentistry Department of School of Dentistry of Islamic Azad University in 2021-2022. The study protocol was approved by the ethics committee of the university (IR.IAU.DENTAL.REC.1400.168).

2-1. Sample size

The minimum sample size was calculated to be 215 patients using the confidence interval for one proportion feature of PASS 11, assuming alpha=0.05, P=0.1, and confidence interval of 0.1. The participants were selected by convenience sampling.

2-2. Inclusion and Exclusion Criteria

The inclusion criteria were age between 4-12 years, and lack of any clinical sign and symptoms of COVID-19.

The exclusion criteria were history of vaccination against COVID-19, history of positive COVID-19 testing in the past two weeks, positive Polymerase Chain Reaction (PCR) test for COVID-19 in the past 2 weeks, uncooperative children, history of oral anomalies, history of intake of immunosuppressants, history of immunodeficiency disorders, diabetes mellitus, AIDS, or lupus erythematosus, history of a recent travel in the past 2 weeks, history of contacting a COVID-19 patient with a positive PCR test in the past 2 weeks.

2-3. Data collection

Demographic information, medical and dental history, and chief complaint of patients were recorded, and a questionnaire was used for screening of COVID-19, which asked for a history of contact with a COVID-19 patient, impairment of the sense of taste, and general symptoms of COVID-19 such as fever, cough, malaise, body aches, nausea, vomiting, and dyspnea. Eligible patients were enrolled and underwent clinical oral examination after informed consent was obtained from the parents. Oral lesions (ulcerative, erosive, vesiculobullous, and plaque-like) were recorded, if present. The patients also underwent a PCR test for COVID-19 which was performed by a trained dental clinician in the Pediatrics department of faculty of dentistry, Azad University of Tehran. The samples were then sent to the pathobiology laboratory of Imam Khomeini Hospital.

2-4. Data analysis

The mean, standard deviation, frequency, and percentage values were reported for the descriptive data. Pearson Chi-square and T-tests were applied to analyze the qualitative and quantitative variables. Fisher's exact test was used when the expected number in table cells was less than 5. Statistical analyses were carried out using SPSS version 22 at 0.05 level of significance.

3- RESULTS

Mean age of the participants was 7.71±1.74 years. Of all (215), 102(47.4%) were males and 113 (56.6%) were females. The mean age was 7.82±1.67 years in males and 7.60±1.80 years in females. Of all, 32 (14.9%) had a positive PCR test result, while 183(85.1%) tested negative for COVID-19. None of the children had a positive history of contact with a COVID-19 patient, any sign/symptom of coronavirus, or impairment of the sense of taste. However, 7 (3.3%) of COVID-19 positive children had oral lesions, out of whom, 2 had aphthous and 5 had herpetic ulcers.

Age (t-test, P=0.432) and gender (Chi-square test, P=0.539) had no significant association with the frequency of asymptomatic carriers. Oral manifestations of COVID-19 (ulcerative, erosive, vesiculobullous, and plaque-like lesions, and impairment of taste) had a significant correlation with the frequency of COVID-19 (Chi-square, P=0.000). Age (t-test, P=0.877) and gender (Chi-square, P=0.539) had no significant correlation with oral manifestations of COVID-19.

Table-1: PCR test based on gender

Parameter			Male	Female	Total
PCR test	Positive	Count	18	14	32
		% within	56.3%	43.8%	100.0%
	Negative	Count	85	98	183
		% within	46.4%	53.6%	100.0%
Total		Count	103	112	215
		% within	47.9%	52.1%	100.0%

Table-2: PCR test based on oral lesions

Parameter			Oral lesions		Total
			Positive	Negative	
PCR test	Positive	Count	7	25	32
		% within	21.9%	78.1%	100.0%
	Negative	Count	0	183	183
		% within	0.0%	100.0%	100.0%
Total		Count	7	208	215
		% within	3.3%	96.7%	100.0%

Table-3: Chi-Square Tests

Value		df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	41.378 [a]	1	0.000	-	-
Continuity Correction [b]	34.725	1	0.000	-	-
Likelihood Ratio	28.095	1	0.000	-	-
Fisher's Exact Test	-	-	-	0.000	0.000
Linear-by-Linear Association	41.186	1	0.000	-	-
N of Valid Cases	215	-	-	-	-

a. 1 cell (25.0%) have expected count less than 5. The minimum expected count is 1.04.
b. Computed only for a 2x2 table

Table-4: Chi-Square Test

Value		df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.049 [a]	1	0.306	-	-
Continuity Correction [b]	0.693	1	0.405	-	-
Likelihood Ratio	1.049	1	0.306	-	-
Fisher's Exact Test	-	-	-	0.341	0.203
Linear-by-Linear Association	1.044	1	0.307	-	-
N of Valid Cases	215	-	-	-	-

4- DISCUSSION

This study evaluated the frequency of asymptomatic child patients with COVID-19 and related oral manifestations in 4-12-year-old children who presented to dental clinics. Among 215 children presented to our department, none of them demonstrated any symptoms, while 14.9% tested positive for COVID-19. Age and gender had no significant association with oral symptoms of COVID-19. However, the frequency of asymptomatic patients had a significant association with oral manifestations of COVID-19.

Candan and Yildirim (10) in Turkey reported that of 278 asymptomatic participants with a mean age of 6.8±3.7 years, only 5 patients (1.80%) had a positive PCR test for COVID-19, which was lower than the rate in the present study. Also, they found no significant correlation between age and gender with the frequency of asymptomatic carriers. Lamborghini et al. (11) showed that children with SARS-CoV-2 are usually asymptomatic carriers. Atsawasuwan et al, (12) performed PCR on saliva samples of 1437 orthodontic patients between 6 to 12 years (41.8% males), and reported that only 9 children tested positive for COVID-19, yielding a frequency rate of 0.626%, which was much lower than the rate obtained in the present study. They concluded that risk of infection transmission still exists from asymptomatic vaccinated patients**.**

In a review study on oral manifestations of COVID-19 Iranmanesh et al, (14) reviewed 35 articles including case reports, case series, and letters to editors. They reported that oral manifestations of COVID-19 included ulcers, blisters, vesicles, pustules, fissured or papillated tongue, macules, papules, plaques, pigments, halitosis, white patches, hemorrhagic patches, necrosis, petechiae, swelling, and erythema. The most common sites of involvement included tongue (38%) followed by labial mucosa (26%) and palate (22%). Oral lesions had an almost equal prevalence in both males and females. Their results were close to the present findings since of 7 patients (3.1%) with oral manifestations in the present study, 42% were males and 58% were females; and oral lesions included ulcers, blisters, and vesicles, dominantly in the labial mucosa and the tongue.

A systematic review conducted in 2023, by Nasiri et al., consisted of 24 studies and 2112 pediatric patients with COVID-19. It reported that most symptoms of the disease are oral lesions, taste and smell disorders, oral candidiasis, hemorrhagic crust, tongue discoloration, lip and tongue fissuring, gingivitis, and salivary gland inflammation. These symptoms were sometimes associated with multi-system inflammatory syndrome in children (MIS-C) or Kawasaki disease (KD). The treatment plan depended on the severity of the oral symptoms and included the symptomatic relief with topical analgesics to systemic medications. It is mentioned in the results of the article that oral manifestations of COVID-19 are relatively prevalent in juvenile patients and can be accompanied by severe systemic diseases, such as MIS-C or Kawasaki illness. Early diagnosis and adequate treatment of these oral symptoms are critical for the best patient outcomes.

Another study was done in 2022, by Candan et al., investigating the prevalence of asymptomatic SARS-CoV-2 infection in children in Sivas province, Central Anatolia. The population of the study included children between the ages of 0-14 who applied to Sivas Oral and Dental Health Hospital General Operating Room for dental treatments between July 2020 and August 2021. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection was diagnosed in 5 patients (approximately 1.80%) out of 278 asymptomatic children.

It is suggested that COVID-19 infection can progress without symptoms in pediatric patients, and, therefore, it may be a risk factor for the spread of the infection. In order to prevent the COVID-19 pandemic, it is recommended to maintain a high level of infection control measures in schools and for day-care.

According to the few studies conducted, the prevalence of asymptomatic carriers in children is high and oral symptoms have also been seen in carriers. Therefore, there is a need to early diagnose patients for treatment and prevention of disease transmission.

4-1. Limitations of the study

This study had some limitations. Due to ethical issues, radiographic examination could not be requested for patients in the present study to assess possible radiographic manifestations of pulmonary involvement. Future multicenter studies with a larger sample size are required to obtain more accurate results. Also, assessment of chest CT and paraclinical test results of patients, if available, would provide more comprehensive information in this regard.

5- CONCLUSION

The frequency of COVID-19 asymptomatic carriers in the study population was 14.9%, and 3.3% of them had oral manifestations, which emphasizes on the need for personal protective equipment to prevent infection transmission.

6- REFERENCES

1. Peng X, Xu X, Li Y, Cheng L, Zhou X, Ren B. Transmission routes of 2019-nCoV and controls in dental practice. Int J Oral Sci. 2020 Mar 3; 12(1):9.

2. WHO Coronavirus (COVID-19) Dashboard. (https://covid19.who.int). Accessed 5 August 2022

3. Sayampanathan AA, Heng CS, Pin PH, Pang J, Leong TY, Lee VJ. Infectivity of asymptomatic versus symptomatic COVID-19. Lancet. 2021 Jan 9; 397(10269):93-94.

4. Rothe C, Schunk M, Sothmann P, Bretzel G, Froeschl G, Wallrauch C, Zimmer T, Thiel V, Janke C, Guggemos W, Seilmaier M, Drosten C, Vollmar P, Zwirglmaier K, Zange S, Wölfel R, Hoelscher M. Transmission of 2019-nCoV Infection from an Asymptomatic Contact in Germany. N Engl J Med. 2020 Mar 5; 382(10):970-1.

5. Darvish S, Salman BN. General Considerations for the Practice of Pediatric Dentistry in the Period of COVID-19 pandemic: A Review. J Biosci Med. 2021 Aug 2; 9(8):29-42.

6. Karbuz A, Akkoc G, Demirdag TB, Ciftdogan DY, Ozer A, Cakir D, Torun SH, Kepenekli E, Erat T, Dalgic N, Ilbay S, et al. Epidemiological, Clinical, and Laboratory Features of Children With COVID-19 in Turkey. Front Pediatr. 2021 May 7; 9:631547.

7. Gao M, Yang L, Chen X, Deng Y, Yang S, Xu H, Chen Z, Gao X. A study on infectivity of asymptomatic SARS-CoV-2 carriers. Respir Med. 2020 Aug; 169:106026.

8. Ludvigsson JF. Children are unlikely to be the main drivers of the COVID-19 pandemic - A systematic review. Acta Paediatr. 2020 Aug; 109(8):1525-30.

9. Coronavirus disease 2019 (COVID-19): Caring for children. U.S. Centers for Disease Control and Prevention. https://www.cdc.gov/coronavirus/2019-ncov/daily-life-coping/children.html. Accessed 2021 Feb 19.

10. Candan M, Yildirim S. Prevalence of asymptomatic SARS-CoV-2 infection in children in Sivas province, Central Anatolia. Eur J Res. 2022 Apr 11; 8(6):771-6.

11. Lamberghini F, Trifan G, Testai FD. Severe acute respiratory syndrome coronavirus 2 infection in asymptomatic pediatric dental patients. J Am Dent Assoc. 2021 Apr; 152(4):277-83.

12. Atsawasuwan P, Del Campo DM, Del Campo LM, Viana G, Ravindran S, Allareddy V, Kadkol S. Positivity rates of SAR-CoV-2 infection in orthodontic patients at the orthodontic clinic, University of Illinois Chicago. PLoS One. 2022 June 23; 17(6):e0270311.

13. Iranmanesh B, Khalili M, Amiri R, Zartab H, Aflatoonian M. Oral manifestations of COVID-19 disease: A review article. Dermatol Ther. 2021 Jan; 34(1):e14578.

14. Nasiri K, Tehrani S, Mohannadikhah M, Banakar M, Alaeddini M, Etemad-Moghadam Sh, V.O.Fernandes G, Heboyan A, Imannezhad S, Abbasi F. Oral manifestations of COVID-19 and its management in pediatric patients:A systematic review and practical guideline. Clin Exp Dent Res. 2023; 9: 922-934.

15. Candan M, Yildirim S. Prevalence of asymptomatic SARS-COV-2 infection in children in Sivas province, Central Anatolia. Eur Res J. 2022; 8(6):771-776.