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Effects of Covid-19 pandemic on nutritional habits, lifestyle changes and dental trauma frequency of children with autism: a cross-sectional study

Hulya Cerci Akcay^{1*}, Duygu Safci², Yelda Kasimoglu², Gamze Aren³, Recep Guloğlu⁴, Murat Coskun⁵, Yaşar Tanir⁵, Meryem Merve Oren⁶ and Arzu Pinar Erdem²

Abstract

Background The Covid-19 pandemic has disrupted daily routines and lifestyle habits, affecting the psychological well-being and dietary habits of individuals, especially children with autism spectrum disorder (ASD). This study aims to evaluate the susceptibility of children with ASD to changes in nutritional habits, lifestyle, and dental trauma during the pandemic related with oral health and compare them with healthy children.

Methods This study, conducted at Istanbul University, involves children aged 3–14 diagnosed with ASD at the Department of Child and Adolescent Psychiatry, and healthy children who visited the Department of Pedodontics. Parents provide written informed consent, and a questionnaire covering various aspects of their child's health and habits is used. Intraoral examinations are conducted for both groups, recording any trauma history or signs, and evaluating possible causes and risk factors. All data were obtained and analysed by SPSS software program version 23.0 with descriptive statistics calculation, Chi square test, Kolmogorov Smirnov, the Mann-Whitney U test, t test and McNemar test was used with p value fixed at 0.05.

Results The results show significant differences between children with ASD and the control group in terms of dental health. Children with ASD had lower dmft and DMFT indices, indicating better dental health ($p=0.005$). However, the frequency of dental trauma was similar between the groups ($p=0.685$). Additionally, the control group exhibited more significant changes in dietary habits during the pandemic, with a higher tendency for snacking throughout the day ($p=0.027$). During lockdowns, parents of children with ASD were statistically more likely to provide junk food when their child was irritable ($p<0.001$). Changes in physical activity levels also differed, with a more pronounced decrease in the control group ($p<0.001$). Furthermore, children with ASD experienced a statistically significant higher rate of disruption in daily routines and inability to participate in social activities and courses ($p<0.001$).

*Correspondence:
Hulya Cerci Akcay
hlycrc@gmail.com

Full list of author information is available at the end of the article



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Conclusion This study sheds light on the unique challenges faced by children with ASD, particularly in terms of dental health and related behaviors. It underscores the importance of interventions to ensure optimal oral health outcomes for this population, especially during periods of disruption like the Covid-19 pandemic.

Keywords Autism spectrum disorder, Dental trauma, Dmft, DMFT, Covid-19, Lifestyle changes, Nutritional habits, Oral health behaviors

Introduction

The Covid-19 outbreak has caused families and individuals to change their life routines and eating habits, and has affected their psychology, especially for children with autism spectrum disorder (ASD), due to the change in their routines [1–3]. ASD is a neurodevelopmental disorder characterized by social communication challenges and repetitive and restricted behaviors (e.g., aggression, self-injury) [4–6].

The changes in their routines due to Covid-19 pandemic, may trigger the self-harming behavior including dental injury that is very common in children with ASD [7–11]. In individuals with special needs, including those with developmental disabilities such as ASD, the presence of traumatic dental injuries (TDI) is a major problem [12–13].

TDI are the second most common problem affecting children after tooth decay. During growth and development process, children are exposed to TDI more than adults, as their motor functions continue to develop [14, 15]. In different studies conducted in Türkiye, the prevalence of dental trauma in healthy children was found to be between 4.4 and 13.4% [15–17]. Literature review indicates that the prevalence of dental trauma in children with ASD is higher compared to children without ASD [18, 19]. Specifically, the study conducted by Fares S. Al-Sehaibany [14] clearly demonstrates this difference with numerical data, showing a prevalence of 24.6% in children with ASD [14].

As a result of being closed at home during the pandemic period, it is a stressful experience for parents to balance their work lives with their personal lives and raising children [9, 20–22]. This situation has the potential to affect the child's well-being as well. According to studies examining the change in dietary habits and lifestyle during the pandemic period; as a result of being closed at home, snacking habits have increased and the disruption of access to daily fresh food has increased the orientation to ready-to-eat foods. With the change in lifestyle, sleep patterns have changed and physical activities have decreased [23–26].

The aim of this study is to evaluate the susceptibility of children with ASD to orofacial trauma during the pandemic period and compare them the healthy group, as well as to question the oral health behaviors, lifestyle, nutritional habits and mood changes that may be related to the risk of TDI. The first Ho hypothesis of this study

is that during the pandemic period, there is no change in the lifestyles, oral health behaviours and eating habits of children with ASD compared to healthy children; the second Ho hypothesis is that the restlessness experienced due to the pandemic does not have any effect on the frequency of dental trauma.

Methods

Study design

Participants

This study, conducted at Istanbul University, involves children aged 3–14 diagnosed with ASD at the Department of Child Psychiatry, and healthy children who visited the Department of Pedodontics between September 2021 and May 2022 aims to evaluate orofacial trauma history, dietary habits, and lifestyle changes during pandemic period.

In sample size calculation, the prevalence rate of orofacial trauma in children diagnosed with autism has been determined to be 24.6% in previous studies [14]. Considering a 10% difference in this rate to be significant post-Covid-19, with 80% power and a 95% confidence interval, the sample size was calculated to be 147 individuals. Taking into account potential losses in the sample, it was increased by 10% and set at 165 individuals. The control ratio was set at 1:1, including 165 children diagnosed with autism and 165 healthy controls without an ASD diagnosis, resulting in a total sample size of 330 participants.

Inclusion criteria

Volunteering to participate in the study between September 2021 and May 2022, during pandemic, children between the ages of 3–14 diagnosed with ASD, healthy children aged 3–14 years, presence of parents who can adequately answer the questionnaires.

Exclusion criteria

Not willing to participate in the study, patients without definite diagnosis of ASD, those younger than 3 years old and over 14 years old, inability of parents to answer the questionnaires or remember the trauma history.

Ethical considerations

The study was approved by the Ethics Committee of Istanbul University, under the approval number 2021/49, and was conducted in accordance with the Declaration of

Helsinki, as revised in 2013. All patients were informed and consented.

Data collection

Parents of all participants provide written informed consent following the initial dental examination. The study utilizes a questionnaire covering sociodemographic profile (13 questions), systemic disease history (4 questions), oral hygiene habits (2 questions), oral health status (10 questions), eating habits (12 questions), lifestyle (3 questions), psychological changes due to the Covid-19 pandemic (3 questions), and TDI history (12 questions).

In addition to intraoral examinations, a validated questionnaire was administered anonymously to parents or guardians by trained researchers in a quiet and private setting to ensure unbiased responses. The researchers, who were both PhD students in pediatric dentistry, provided clear instructions and sufficient time for participants to complete the questionnaire independently.

To minimize potential bias, the researchers avoided leading questions and only provided clarification when explicitly requested. This approach ensured clarity, reduced the risk of misinterpretation, and maintained the integrity of the data. For both groups, the researchers recorded any history or signs of TDI, evaluated possible causes, types, timing, and locations of the trauma, as well as accompanying clinical findings and risk factors such as overjet and overbite.

TDI calibration was conducted by two experienced pediatric dentists who underwent prior training to standardize assessment criteria. The evaluation of TDI was based on the Andreasen classification, a widely accepted trauma scale that categorizes injuries according to the type and severity of trauma, including enamel fractures, crown fractures, root fractures, luxations, and avulsions [27].

Parafunctional habits, such as bruxism, nail-biting, and pencil-chewing, were assessed using a structured questionnaire completed by the parents or guardians. The questionnaire included validated items derived from established behavioral assessment tools to ensure reliability and comprehensiveness. Additionally, clinical examinations were conducted to observe physical signs indicative of parafunctional habits, such as wear facets on teeth, cheek biting, and lip lesions. Overjet and overbite are measured using an intraoral mirror and a periodontal probe. The DMFT/dmft index is used to assess caries history in intraoral examinations [28].

Data collection and reporting was based on STROBE Statement Checklist for cross-sectional studies.

Data analysis

The data were evaluated using quantitative analysis methods. The analysis was conducted employing the licensed

SPSS software program from Istanbul University, Faculty of Medicine. Descriptive statistics were reported, with continuous data presented as mean, standard deviation, median, minimum, and maximum values, while categorical data were expressed as frequencies and percentages.

The normality of the data distribution was assessed using the Kolmogorov-Smirnov test. For the statistical comparison of independent groups, the t-test was applied to parametric data, and the Mann-Whitney U test was used for non-parametric data.

In dependent groups, the McNemar test was utilized to compare prevalence (pre- and post-pandemic evaluations). The Chi-square test was employed for the comparison of categorical data in independent groups. Additionally, correlation analysis was performed. Statistical significance was determined at the 95% confidence level, with a p-value of less than 0.05 considered significant.

Results

Participants were divided into three age groups: 3–6 years old [5.15 ± 0.76], 7–10 years old [8.36 ± 1.09], and 11–13 years old [12.04 ± 0.89]. In the 3–6 age group, the control group (CG) had a distribution of 24.8% while ASD had 32.1%. In the 7–10 age group, the CG had 41.8% and the ASD had 46.1%. In the 11–13 age group, the CG had 33.3% and the ASD had 21.8%. The age distribution was not significantly different ($p = 0.054$). When examining the gender distribution, it was observed that the male distribution was higher in the ASD. When participants were evaluated based on the severity levels of autism as defined by the DSM-5 criteria, the distribution was as follows: level 1 (requiring support) accounted for 27.8%, level 2 (requiring substantial support) for 35.15%, and level 3 (requiring very substantial support) for 36.9%.

When sociodemographic factors were evaluated, family income levels were found similar across groups ($p = 0.67$); mothers in the ASD had lower educational levels (64.2%) compared to the CG (52.7%) ($p = 0.034$) while fathers' educational levels did not differ significantly ($p = 0.654$). Mothers were determined the primary caregivers in both groups, with no significant difference ($p = 0.067$). However, more mothers in the ASD were unemployed (92.7%) compared to the CG (85.5%) ($p = 0.034$).

The results demonstrated significant differences in dental health between children in the ASD and CG. The scores for primary teeth (dmft index: ASD 1.7 ± 3.0 , CG 5.1 ± 4.4 ; $p = 0.000$) and permanent teeth (DMFT index: ASD 0.2 ± 0.8 , CG 2.0 ± 2.5 ; $p = 0.000$) were as follows. The overall comparison also revealed a significant difference ($p = 0.005$), confirming that children in the ASD had better dental health compared to those in the control group.

Table 1 Distribution of variables relative to history of dental trauma and parafunctional oral habits

	ASD (n) (%)	C (n) (%)	p*
Overjet			
Yes	26 (15.8)	43 (26.1)	0.021
No	139 (84.2)	122 (73.9)	
Overbite			
Yes	3 (1.8)	13 (7.9)	0.01
No	162 (98.2)	152 (92.1)	
Parafunctional oral habits			
Yes	34 (20.6)	8 (4.8)	< 0.001
No	131 (79.4)	157 (95.2)	
Total	165 (100)	165 (100)	

*Chi-square test. $p < 0.05$. ASD: Autism spectrum disorder, C: Control

Table 2 Dental care amid Covid-19

	ASD (n) (%)	C (n) (%)	p*
Postponing dental appointments during the Covid-19 pandemic			
Yes	83(50.3)	48(29.1)	0.001
No	82 (49.7)	117(70.9)	
Hearing that dental services have been suspended due to Covid-19			
Yes	5 (3.0)	12 (7.3)	0.081
No	160 (97.0)	153 (92.7)	
The fear of the Covid-19 transmission risk			
Yes	38 (23.0)	34 (20.6)	0.594
No	127 (77.0)	131 (79.4)	
Total	165 (100)	165 (100)	

*Chi-square test. $p < 0.05$. ASD: Autism spectrum disorder, C: Control

The frequency of dental trauma during pandemic was compared between the ASD and the CG. The results indicated that in the ASD, 4 children (2.4%) experienced dental trauma, while in the CG, 2 children (1.2%) experienced dental trauma with no statistically significant difference between the groups ($p = 0.685$). Although no significant correlation was identified between the severity of ASD and the presence of TDI, the prevalence of TDI was observed to be higher in the ASD, compared to CG.

When examining the variables related to trauma, overjet was present in 15.8% of the ASD compared to 26.1% of the CG ($p = 0.021$). Overbite was observed in 1.8% of the ASD compared to 7.9% of the CG ($p = 0.01$). Parafunctional oral habits were more common in the ASD (20.6%) than in the CG (4.8%) ($p < 0.001$). Although TDI frequency was high in the ASD, the distribution of variables related to history of trauma did not align with the observed TDI rates (Table 1). No significant correlation was identified between autism severity and the presence of overjet, overbite, or parafunctional oral habits; however, these conditions were observed at notably higher rates in the ASD, compared to CG.

The study found significant differences in behaviors related to taking dental care service during the Covid-19 pandemic between the groups. More children in the ASD

Table 3 Dietary habits of the ASD and control group during the pandemic

	ASD (n) (%)	C (n) (%)	p*
Changes in dietary habits during the pandemic period			
Yes	33 (20.0)	50 (30.3)	0.039
Undecided	2 (1.2)	5 (3.0)	
No	130 (78.8)	110 (66.7)	
Changes in frequency of food consumption			
Yes	46 (27.9)	82 (49.7)	< 0.001
Undecided	7 (4.2)	11 (6.7)	
No	112 (67.9)	72 (43.6)	
Changes in the frequency of junk food consumption			
Yes	57 (34.5)	123 (74.5)	< 0.001
Undecided	3 (1.8)	4 (2.4)	
No	105 (63.6)	38(23.0)	
Total	165 (100)	165 (100)	

*Chi-square test. $p < 0.05$ ASD: Autism spectrum disorder, C: Control

postponed dental appointments (50.3%) compared to the CG (29.1%) ($p = 0.001$). Hearing about the suspension of dental services due to Covid-19 was reported by 3.0% of the ASD and 7.3% of the CG. The fear of Covid-19 transmission risk was similar between the groups (Table 2).

The results indicated significant differences in dietary habits between the ASD and the CG during the Covid-19 pandemic. Changes in dietary habits were reported by 20.0% of the ASD and 30.3% of the CG ($p = 0.039$). Changes in the frequency of food consumption were noted in 27.9% of the ASD compared to 49.7% of the CG ($p < 0.001$). Additionally, changes in the frequency of junk food consumption were reported by 34.5% of the ASD and 74.5% of the CG ($p < 0.001$). These findings suggest that the CG experienced more significant changes in dietary habits and food consumption during the pandemic compared to the ASD (Table 3).

The results showed significant differences in physical activity changes between the ASD and CG during the pandemic. Physical activity decreased in 80.6% of the CG compared to 58.2% of the ASD. Additionally, the ASD showed higher rates of disruptions in social activities, course participation, and daily routines ($p < 0.001$). Specifically, 92.7% of the ASD, versus 69.1% of the CG, experienced these disruptions, with daily routine changes being more common in the ASD (85.5% vs. 55.8%) (Table 4).

Discussion

The aim of this study is to evaluate the susceptibility of children with ASD to orofacial trauma during the pandemic period and compare them with the healthy group, as well as to question the oral health behaviors, nutritional habits, lifestyle and mood changes, that may be related to the risk of TDI.

Table 4 Changes in physical activity

	ASD n (%)	C n (%)	p*
Changes in physical activity compared to pre-quarantine period			
Decreased	96 (58.2)	133 (80.6)	0.039
Remained	67 (40.6)	29 (17.6)	
Increased	2 (1.2)	3 (1.8)	
Disruptions in social activities			
Yes	12 (7.3)	51 (30.9)	<0.001
No	153 (92.7)	114 (69.1)	
Disruptions in course participation			
Yes	12 (7.3)	51 (30.9)	<0.001
No	153 (92.7)	114 (69.1)	
Disruptions in daily routines			
Yes	24 (14.5)	73 (44.2)	<0.001
No	141 (85.5)	92 (55.8)	
Total	165 (100)	165 (100)	

*Chi-square test. $p < 0.05$ ASD: Autism spectrum disorder, C: Control

In this study, some socio-demographic differences were examined between the groups, particularly in terms of gender distribution, maternal education, and maternal employment status [9, 29–31]. The unemployment rate is higher in the ASD due to caring for their children and the education level is lower. Although this study aimed to achieve an equal match gender distribution during the pandemic period, the limitations in patient admission rates and the fact that ASD is more commonly observed in boys prevented the targeted distribution from being achieved.

This study identified significant differences in dental health between the ASD group and the CG. Children in the ASD group exhibited lower dmft and DMFT indices, indicating superior dental health. These findings are consistent with previous research suggesting that ASD may exert a protective effect against dental caries, potentially due to distinct dietary habits and oral hygiene practices. For instance, Loo et al. [32] reported that children with ASD had significantly lower DMFT scores compared to their neurotypical peers, despite the challenges associated with maintaining oral hygiene. This has been attributed to restricted dietary preferences and reduced sugar intake commonly observed in children with ASD. Similarly, Fakroon et al. [33] found that children with ASD demonstrated lower DMFT and dmft indices, further supporting the notion that ASD may confer an advantage in terms of dental health. The authors hypothesized that the differences in oral health outcomes could be linked to the unique nutritional behaviors and the greater assistance these children receive in managing oral hygiene. In contrast, Corridore et al. [34] highlighted that while dental caries prevalence among children with ASD varies across studies, periodontal health outcomes are consistently poorer in this population. Their systematic review revealed higher periodontal indices (PI and GI) and an

increased incidence of periodontal disease in children with ASD compared to their neurotypical peers. This discrepancy in findings between caries and periodontal health underscores the complex interplay of factors influencing oral health in children with ASD, including oral hygiene practices, dietary habits, and access to dental care. These differences emphasize the need for tailored interventions to address the specific oral health needs of this population. In this study, no statistically significant difference in the frequency of TDI was found between the ASD and CG groups. Previous retrospective studies have typically reported a higher incidence of TDI in children with ASD compared to typically developing children [35]. Similarly, a systematic review and meta-analysis conducted by Andonovski and Antonarakis [36] identified a significantly higher prevalence of dentoalveolar trauma among individuals with ASD. However, this study specifically focused on comparing trauma frequency between the ASD and CG during the pandemic period. Despite the changes in living conditions, no significant difference in TDI experiences was observed between the two groups.

Children with ASD may engage in repetitive behaviors or have difficulties with sensory processing, which could increase their risk of dental trauma. Additionally, communication difficulties and a lack of understanding of danger may also contribute to the higher incidence of TDI in children with ASD [14, 19, 33]. Although the study by Habibe et al. [20] reported that findings such as overjet and overbite increased the frequency of dental trauma, this study did not find a relation. However, due to the small sample size of children with TDI, further research with larger sample sizes is needed to confirm these results and investigate potential contributing factors in children with ASD.

In this study, which also examined lifestyle changes, the ASD exhibited a statistically significantly higher rate of inability to participate in social activities and courses, as well as alterations in daily routine ($p < 0.001$). The second Ho hypothesis is that the restlessness experienced due to the pandemic and inabilities do not have any effect on the frequency of TDI was accepted.

When examining parafunctional oral habits, it was found that the parafunctional oral habits in the ASD were similar to those reported in the literature [37]. Our study did not specifically investigate tooth grinding, but our findings of higher rates of parafunctional oral habits in children with ASD are consistent with studies reporting a higher prevalence of tooth grinding and bruxism in this population [38–40].

The study examined behaviors related to dental care during the Covid-19 pandemic. The findings revealed significant differences between the groups in terms of postponing dental appointments and hearing about

the suspension of dental services. Children in the ASD were more likely to postpone dental appointments compared to the control group. This finding may reflect the challenges faced by children with ASD in accessing and receiving dental care, possibly due to factors such as sensory sensitivities, communication difficulties, or caregiver burden [41, 42].

Furthermore, during the pandemic, teledentistry emerged as a promising solution to address disruptions in dental care services. While the Ministry of Health more rapidly integrated online communication platforms within medical faculties, the adoption of teledentistry within dental faculties was significantly delayed [43]. This lag in the implementation of teledentistry may have contributed to further challenges in accessing care, particularly for vulnerable populations such as children with ASD, who already face considerable barriers to receiving dental treatment [44]. In line with these findings, Voza et al. [45] emphasized that children with special needs, including those with ASD, often experience additional barriers to accessing dental care due to logistical, economic, and professional constraints. They highlighted the importance of individualized preventive strategies, such as regular dental check-ups and caregiver involvement, to mitigate the risks associated with delayed dental care. The challenges faced during the pandemic further underscore the need for systemic changes in dental care delivery to better accommodate vulnerable populations. This study suggests that both groups may have similar levels of concern about contracting Covid-19, despite differences in their behaviors related to dental care [7, 8, 13]. Children in the CG were more likely to report changes in dietary habits, such as alterations in the frequency of food consumption and increased consumption of junk food, compared to the study group. This difference may be attributed to various factors, including potential differences in coping mechanisms, routines, or caregiver practices between the two groups. The lower prevalence of dietary changes in the ASD could be indicative of more stable dietary patterns or a higher level of adherence to pre-existing dietary routines among children with ASD. Guerra et al. [46] emphasized the importance of parental education in shaping children's dietary habits and oral health practices. Their findings revealed that informed and educated caregivers are more likely to implement consistent dietary routines and promote healthier eating behaviors in children. These observations support the notion that the stability of dietary patterns in the ASD may be linked to the proactive role of caregivers who adhere to structured nutritional guidelines and preventive measures. However, further research is needed to explore the underlying reasons for these differences and their potential impact on the nutritional status and

overall health of children with ASD during pandemics or other periods of disruption [22–25].

The first null hypotheses of this study was not satisfied; significant changes in lifestyles and eating habits were observed among children with ASD compared to healthy children. Additionally, second null hypothesis, the restlessness experienced due to the pandemic and their lifestyle changes does not have any effect on the frequency of TDI, was supported. Within the limitations of this cross-sectional study, it does not allow for the assessment of long-term outcomes or causal relationships. Future research should aim to use larger and more homogeneous samples, and employ longitudinal designs to better understand the long-term impacts and validate these findings in diverse populations.

Conclusion

In conclusion, this study highlights several important findings regarding dental health and related behaviors in children with ASD patient compared to control group during pandemic. The study revealed that children with ASD had better dental health. Furthermore, children in the CG exhibited more significant changes in dietary habits during the pandemic, including alterations in food consumption frequency and increased junk food consumption. Neither in CG nor in ASD exhibited increase in TDI frequency during the determined dates of this study.

However, children with ASD were more likely to postpone dental appointments during the Covid-19 pandemic, indicating potential challenges in accessing dental care. This finding underscores the need for dental care interventions for children with ASD, considering their unique behavioral and sensory needs. To address this issue, teledentistry was planned to be implemented.

The findings of this study suggest that the COVID-19 pandemic had a detrimental impact on the daily routines and social engagement of children with ASD. However, it did not induce significant changes in their dietary behaviors, nor did the psychological distress associated with the pandemic lead to an increased incidence of TDI.

Overall, this study contributes to our understanding of the dental health and related behaviors of children with ASD, during pandemic, highlighting the importance of addressing their specific needs to ensure optimal oral health outcomes. Further research is needed to explore the underlying factors contributing to these differences and to develop effective interventions for this population and to promote correct behaviors, improve lifestyles, and protect the general/dental health, implementing educational programs is essential.

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12903-025-05697-w>.

Supplementary Material 1

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Not applicable.

Author contributions

All authors designed the research study. MMO analyzed the data. HCA, YK, MC and APE wrote the manuscript. HCA, YK and DS performed the research. GA, RG, YT, MC and APE provided help and advice on. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript.

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Data availability

Authors regret to inform that the data used in this study is not available for sharing. The data may contain sensitive information or be subject to copyright or patent restrictions, which restrict their disclosure. Additionally, ethical or privacy considerations, participant consent, or other legal regulations may prevent data sharing. Furthermore, authors may not have access to the necessary resources for data sharing. However, for any further information or verification requests regarding the findings of this study, please feel free to contact corresponding author.

Declarations

Ethics approval and consent to participate

This descriptive cross-sectional study was conducted at Istanbul University and approved by the Ethics Committee of Istanbul University, under the approval number 2021/49. The study protocol followed the Declaration of Helsinki ethical standards and guidelines for research involving human subjects. Informed consent was obtained from all participants before enrolment in the survey.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Author details

¹Department of Pedodontics, Kocaeli Health and Technology University Faculty of Dentistry, Kocaeli, Türkiye, Turkey

²Department of Pedodontics, Istanbul University, Istanbul, Türkiye, Turkey

³Department of Pedodontics, Istinye University, Istanbul, Türkiye, Turkey

⁴Department of Surgical Medical Science, Istanbul University, Istanbul, Türkiye, Turkey

⁵Department of Child and Adolescent Psychiatry, Istanbul University, Istanbul, Türkiye, Turkey

⁶Department of Public Health, Istanbul University, Istanbul, Türkiye, Turkey

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