

An Evaluation of The Effect of Passive Smoking on Caries and Periodontal Index in Preschool Children

Okul Öncesi Çocuklarda Pasif Sigara İçmenin Çürük ve Periodontal İndeks Üzerine Etkisinin Değerlendirilmesi

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ABSTRACT

Objective: To observe the changes that passive smoking causes in early childhood caries and periodontal tissues in preschool children.

Method: In our study, caries, periodontal, and plaque indexes were measured in preschool children aged 3-5 years and subjected to passive smoking. A 7-item questionnaire was administered to the parents.

Results: Periodontal and plaque indexes of children whose parents were smokers were higher than those of the children of non-smoking parents. In the evaluation made according to the education level of the parents, it was seen that the mean plaque index of the children of the fathers who were secondary school graduates was higher than that of parents with university degree. It was determined that the plaque index of children who did not use fluoride toothpaste and did not consume milk daily were higher than that of the other children. It was determined that the caries indexes of children who consumed sweet snacks during day were significantly higher than those who did not.

Conclusions: Passive smoking causes many changes in dental caries, periodontal health, and plaque status in preschool children. In order to protect the oral health of children in the risk group, preventive measures should be taken in the early period and routine dentist controls should be made.

Key words: Secondhand smoke, dental caries, periodontal status, dental plaque index

ÖZ

Amaç: Çalışmamız pasif içiliğin okul öncesi dönemdeki çocuklarda görülen erken çocukluk çağı çürüğü ve periodontal dokular üzerinde meydana getirdiği değişiklikleri gözlemlemek amacıyla yapılmıştır.

Yöntem: Çalışmamızda pasif içicilik görülen okul öncesi dönemdeki 3-5 yaş aralığındaki çocuklarda çürük, periodontal ve plak indeksleri ölçülmüştür. Ebeveynlerine ise 7 soruluk bir anket uygulanmıştır.

Bulgular: Çalışmamıza göre, ebeveynleri sigara içen çocukların içmeyenlere göre periodontal ve plak indekslerinin daha yüksek değerlerde olduğu görülmüştür. Ebeveynlerin eğitim düzeyine göre yapılan değerlendirmede, babası ortaokul mezunu olan çocukların plak indeksi ortalamalarının, üniversite mezunu olanlara göre daha yüksek olduğu görülmüştür. Florlu diş macunu kullanmayan ve günlük süt tüketimi olmayan çocukların plak indekslerinin diğer çocuklara göre daha yüksek olduğu tespit edilmiştir. Gün içerisinde şekerli atıştırmalık tüketen çocukların, tüketmeyenlere göre çürük indekslerinin anlamlı derecede daha yüksek olduğu tespit edilmiştir.

Sonuç: Pasif içicilik okul öncesi dönemdeki çocuklarda diş çürüğü, periodontal sağlık ve plak durumu ile ilgili birçok değişikliğe neden olmaktadır. Risk grubundaki çocukların oral sağlığını korumak için erken dönemde koruyucu önlemlerin alınması ve rutin diş hekimi kontrollerini yaptırması gerekmektedir.

Anahtar Kelimeler: Pasif içicilik, diş çürüğü, periodontal durum, dental plak indeksi

INTRODUCTION

Passive smoking is defined as the inhalation of all harmful substances by non-smokers exposed to cigarette smoke.¹ Passive smoking can also cause adverse effects on oral health, apart from many systemic diseases such as cancer and cardiovascular diseases.²⁻⁴

Early childhood caries in the primary dentition in preschool children is a multifactorial, contagious, and chronic disease.⁵ It is seen that passive smoking causes an increase in the frequency of caries due to an increase in the number of *Streptococcus mutans* in children and suppression of the immune system.⁶ It was reported that the increase in the level of cotinine, which is the metabolite of nicotine, in the blood of children aged 4-11 years exposed to cigarette smoke increases the susceptibility to dental caries.⁷



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Cigarette smoke impairs revascularization in periodontal tissues, reduces the amount of oxygen going to the tissues, increases biofilm formation and causes periodontal disease by suppressing inflammatory responses. People who have never smoked but were exposed to secondhand smoke have a 1.6 times higher risk of developing periodontal disease than non-smokers.⁸ An increase in melanin pigmentation in the gingiva was also detected in children with passive smoking.^{9,10}

According to the hypothesis of our study, we hypothesized that caries, periodontal, and plaque indices would be higher in preschool children exposed to passive smoking due to the effect of smoking on the immune system compared to their healthy peers. Our study was carried out to observe the changes caused by passive smoking on early childhood caries and periodontal tissues in preschool children.

METHODS

Ethical approval was obtained for the study from the Non-Invasive Ethics Committee of Adiyaman University Faculty of Medicine (Decision Number: 2021/10-27, date: 14/12/2021).

The sample size of the study was determined as 160 (95% confidence interval, %5 margin of error).

Our study was carried out in cooperative pre-school children aged 3-5 years. Children with mood disorders, behavioral disorders, and hyperactivity, and who could not cooperate were excluded from the study.

Informed consent was obtained from the patient and their parents before the study. A questionnaire consisting of 7 items was administered to the parents of the patients. In the questionnaire, there are questions about the smoking status of the parents, their educational status, the tooth brushing habits of the parents and children, whether they use fluoride toothpaste, the child's consumption of sweet snacks during the day and how many times a day they consume, and the child's daily milk drinking status.

Intraoral examinations of the patients were performed by two pediatric dentists (XX, XX) in the dental unit under the reflector light. Caries the decayed, filled (df) indexes were measured with the help of sterile mirror and probe, and The community periodontal index of treatment needs (CPITN) indexes and plaque indexes were measured and recorded with the help of periodontal probe.

The data obtained as a result of the clinical examination were recorded. For the CPITN indexes, the number of quadrants with Code 2 and above, indicating the need for periodontal treatment, were calculated. The patients were divided into groups according to the questions in the questionnaire. The obtained index results were calculated separately for each group. The index data obtained in each group of patients were collected and divided by the number of patients in the group, and a mean of df, plaque and CPITN indexes was obtained for each group. The mean scores obtained were compared with the SPSS program.

Statistics

Statistical analyses were performed using IBM SPSS Statistics for indows, version 22 (IBM Corp., Armonk, NY, USA). Number, mean, standard deviation, and percentage calculations were used for descriptive statistics. One-way ANOVA analysis was used to compare the means. Significance was evaluated as $P < .05$.

RESULTS

A total of 198 pediatric patients participated in the study. Of these patients, 101 were male and 97 were female. The mean age of the patients was 4.6 ± 0.57 years.

It was found that the periodontal and plaque indexes of the children whose parents smoked significantly increased, and there was no significant difference between the caries indexes ($P > .05$) (Figure 1). It was observed that the number of cigarettes that parents smoked during the day did not make a significant difference on caries, periodontal, and plaque indexes.

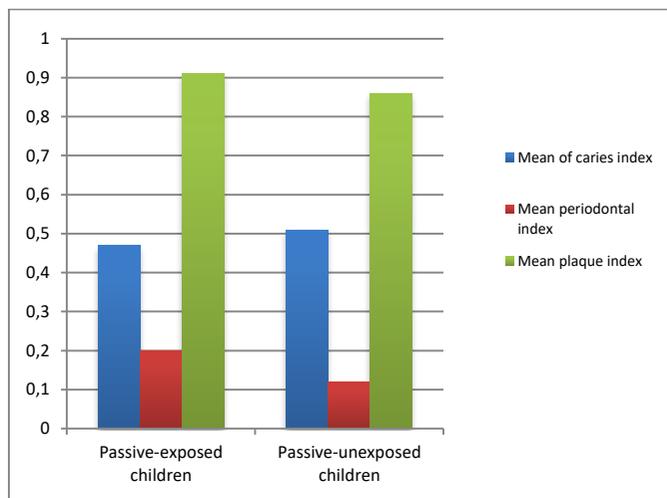


Figure 1. Comparison of children's index means according to parents' smoking status

There was no statistically significant difference between the caries, periodontal, and plaque indexes of the children according to the education level of the mother ($P > .05$) (Table 1). However, when the caries, periodontal, and plaque indexes of the children were evaluated according to the education level of the father, it was observed that the plaque index means of the children of secondary school graduates were statistically higher than those of university graduates ($P > .05$) (Table 1).

No significant difference was found between the caries and periodontal and plaque indexes of the children according to the number of daily brushing of the parents and whether they brushed their child's teeth or not ($P > .05$). In addition, the plaque indexes of the children who did not use fluoride toothpaste were significantly higher than those who used it (Table 1).

Although it was observed that the caries indexes of children who consumed sweet snacks during the day were significantly higher than those who did not, it was determined that the daily consumption frequency of sweet snacks did not make changes on caries, periodontal, and plaque indexes (Table 1).

The average plaque index of the children who drank milk 3 times during the day was statistically lower than the children who drank no milk per day. No statistically significant difference was found between the other groups ($P > .05$) (Table 1).

Table 1. Data from the study population.

Indexes						
Variable	Caries Index Mean	P	Periodontal Index Mean	P	Plaque Index Mean	P
Number of cigarettes smoked by the parent per day						
None	0.45	.55	0.23		0.78	.49
>20				.25		
<20	0.39		0.18		0.94	
Mother's education level						
0-8 years (Middle School)	0.5		0.15		0.9	
8-12 years (High school)	0.5	.73	0.17	.64	0.92	.13
12 years or more (University)	0.45		0.18		0.82	
Father's education level						
0-8 years (Middle School)	0.53	.52	0.15	.49	0.93	.02*
8-12 years (High school)	0.47		0.21		0.90	
12 years or more (University)	0.46		0.14		0.85	
Parent's number of brushing teeth per day						
None	0.54	.65	0.17	.21	0.91	.875
1-2 times	0.48		0.16		0.88	
3-4 times	0.31		0.14		0.92	
Parents brushing their child's teeth per day						
Yes						
1-2 times	0.45	.46	0.19	.78	0.89	.213
3-4 times	0.57		0.25		0.87	
No	0.53		0.13		1	
Use of fluoride toothpaste						
Yes	0.54	.75	0.16	.36	0.93	.0*
No	0.46		0.16		0.87	
Daily consumption of sweet snacks						
Yes						
Once	0.48	.02*	0.18	.55	0.88	.51
Twice	0.5		0.15		0.93	
No	0.46		0.17		0.88	
Daily milk consumption						
Yes (Glass)						
1	0.48	.87	0.15	.56	0.87	.02*
2	0.49		0.13		0.90	
3	0.59		0.04		0.63	
No	0.49		0.19		0.91	

DISCUSSION

Children exposed to cigarette smoke experience similar effects as smokers on periodontal tissues. Cigarette smoke and its components reduce the amount of oxygen delivered to periodontal tissues by causing vasoconstriction and they delay wound healing, both of which pave the way for the formation of periodontal disease.¹¹ In our study, it was determined that periodontal and plaque indexes in children with passive smoking were higher than those in healthy children.

Many studies have shown that exposure to cigarette smoke is an important risk factor for early childhood caries, which is common in preschool children.^{5,12,13} It has been observed that tooth mineralization is negatively affected and the susceptibility to dental caries increases in children with passive smoking.¹⁴ There is a decrease in vitamin C levels in the blood of smokers and their children, and it is stated that this is associated with an increase in the number of *Streptococcus mutans*.^{15,16} In our study, it was observed that there was no difference between the decayed, missing and filled teeth (DMFT) means of children with passive smoking and healthy children. It is thought that the data in our study originated from the selected population.

Studies have shown that there is a relationship between smoking status of parents and education level, diet, and oral hygiene habits.¹⁷ It was observed that smoking habits and consumption of sugar-containing beverages between meals were higher in parents with low education levels, while tooth brushing habits were lower.¹⁸ In our study, it was observed that there was no relationship between the

education level of the mother and the caries, periodontal, and plaque indexes of the child, but as the education level of the father decreased, the plaque indexes of the child increased and oral hygiene habits decreased. In addition, in our study, it was observed that the plaque indexes of the children using fluoride toothpaste were lower than those of the other children. Hanioka et al. reported that there was no relationship between parents' smoking status and their child's tooth brushing with fluoride tooth paste and plaque level.⁵

Children's daily consumption of sweet snacks and tooth brushing habits were found to be associated with parents' smoking.⁵ In our study, the fact that the mean caries index was higher in children with high daily sugar consumption indicates that sugar is an important risk factor for dental caries. The increase in cotinine level in children's saliva due to parental smoking results in an increase in the amount of *S. mutans*, thus an increase in the amount of caries.¹⁹

Milk and dairy products can change the microbial flora in the mouth due to their probiotic content.²⁰ The most frequently studied probiotics related to oral health are *Lactobacilli*. These microorganisms help to protect periodontal tissue health by showing an inhibitory effect against biofilm members and reducing the concentrations of TNF-alpha, IL-1Bet, and IL-17 in the gingival groove fluid.^{21,22} For this reason, it is thought that periodontal health will be better in children with increased consumption of milk and dairy products. Hanioka et al. reported that there was no relationship between passive smoking and daily milk consumption.⁵ In our study, mean plaque index was lower in children with high daily milk consumption.

One of the limitations of our study is its cross-sectional design. Studies involving larger populations are needed to investigate the effect of passive smoking on caries, periodontal, and plaque indices in preschool children.

CONCLUSION

Passive smoking causes many changes in dental caries, periodontal health, and plaque status in preschool children. In order to protect the oral health of children in the risk group, preventive measures should be taken in the early period and routine dentist controls should be made.

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Informed Consent: All participants were provided with detailed explanations of the procedures and written informed consent was obtained.

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