

Relationship Between Parent's Secondhand Smoke and Growth of Infant Teeth

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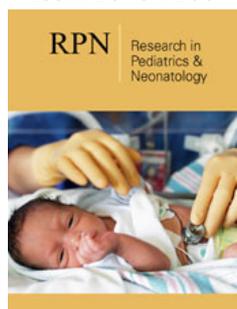
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Abstract

Background & aim: Cigarette smoke, due to its oxidative stress-causing substances, causes undesirable changes in the infant tooth development and may cause delay in the growth of teeth. This project was conducted with the aim of investigating the association between secondhand parent's smoking and growth of infant teeth.

Methods & materials: This is a case-control study that was conducted to determine the impact of secondhand parents' smoking and growth of infant teeth in children referred to the dental clinic of Bahar Hospital of Shahrood in 2019. Eligible patients were selected by simple census method to complete the sample size, based on having or not having a history of dental growth disorder, they were divided into case and control groups and entered the study and history of secondhand parents' smoking.

Results: The mean age of the children was 37.6±6.21 months. Exposure of secondhand parents' smoking were 83 cases (80.6%) in the case group and 51 (49.5%) in the control group, which was significantly higher ($p=0.001$) in the case group. It was found that secondhand smoking could significantly increase the incidence of delay of teeth growth odds ratio [OR=1.55 (95% Confidence: 1.313-1.857)]

Conclusion: The results of this study showed that secondhand parent's smoking can increase the risk of delay of teeth growth and increase its odds ratio by about 1.5 times, but more definitive research is needed to confirm this finding.

Keywords: Secondhand parent's smoking; Teeth growth; Infant

Introduction

Smoking is one of the most common health problems; but not only its use but also exposure to cigarette smoke can cause many harm to human beings; so even being exposed to cigarette smoke increases the risk of lung cancer or cardiovascular disease [1]. Most of the effects of smoking are caused by smoke. The effects of cigarette smoke are very diverse and affect almost all body systems. People around the smoker are also unaware of these side effects and are being treated as secondhand smoking [2]. Some people with special conditions are more sensitive and suffer more complications. Elderly people with underlying illnesses, patients taking over-the-counter medications, infants and children, are more susceptible to cigarette smoke [3,4]. Some of these complications are not diagnosed even at birth and develop in different forms as the child grows older [5]. One of the most likely injuries caused by exposure to secondhand smoke is the developmental disorders of infants and toddlers, especially those who have not only physical but also mental health problems [5,6]. Problems such as abnormal weight gain, increased risk of Sudden Infant Death Syndrome (SIDS), leukemia, respiratory diseases such as bronchitis and asthma, middle ear infections, and increased risk of delayed tooth growth and premature decay are some of the problems associated with exposure to secondhand smoke [7]. Cigarette smoke causes undesirable changes in infant teeth due to stress-induced stimulants such as quinine [7,8].

Therefore, exposure to secondhand smoke is expected to not only increase the risk of oxidative stress on the body, but also increase the risk of dental disorders, especially growth retardation. At about 6 months of age, develops the first milk teeth, which are two teeth in the middle of the lower jaw. The normal time to start and grow milk teeth is between 5 and 7 months, but a child may have a tooth erupted much earlier than this, for example, at one month of age or the onset of teething may be delayed until age of 18 months, which is normal. The validity of this finding in previous studies on smoking in parent's showed that the delay in the growth of children, improper weight gain of the child and the delay in the growth of milk teeth in infants of smoking parents are higher than those who did not smoke [9]. However, there is insufficient and documented information about the effects and risks of second-hand smoking in breastfeeding parents. However, in some societies up to 69% of infant are exposed to cigarette smoke at home [10,11]. In this regard, not only cigarette smoking, but also the rate of cigarette smoking has been effective so that the consumption of less than 10 cigarettes per day by the parents is 1.04 times and the consumption of more than 10 cigarettes per day by the parents up to 1.8 times increases the risk of adverse infant development outcomes compared to non-smoking parents in infant exposed to cigarette smoke [12]. Given the importance of the issue, the high prevalence of smoking in society, the present study was conducted to survey the association between secondhand parent's smoking and growth of infant teeth in children referred to the dental clinic of Bahar Hospital in Shahroud, Iran.

Materials & Methods

The present study was received an ethics code number (IR.SHMU.REC.1398.089 on 12.3.2019) from Research Deputy of Shahroud University of Medical Sciences. The essential information and the objectives of the study were explained to the parents of the patients, and written consent was obtained for participation in the plan.

This study is an intervention study in a human sample and in order to determine the relationship between the developmental disorder of infant teeth and parent's smoking, children referred to the dental clinic of Bahar Hospital in Shahroud were included between January and December 2019. In this study, eligible children were selected by simple census method to complete the sample size, based on having or not having a history of the developmental disorder of milk teeth, they were divided into case and control groups and entered the study. The case group included those who already had or had a history of the developmental disorder of milk teeth. The development of deciduous teeth begins in the embryonic period. Evidence of the development of teeth can be seen in the sixth week of embryonic life. At birth, the baby has 20 milk teeth

or temporary teeth (10 in the upper jaw and 10 in the lower jaw) that are hidden in the jawbone and under the gums. The normal time to start teething in most children is between 4 and 7 months. Of course, growth time is not the same in all children, and in some children it may occur earlier than 4 months or later than one year, which is perfectly normal. The first baby tooth to grow is usually the anterior middle tooth of the mandible. The growth of deciduous teeth is usually complete by the end of three years of age, at which time the child has 20 deciduous teeth.

Although the time of eruption is different, the order of eruption of deciduous teeth is usually as follows:

1. The two anterior middle teeth of the mandible (Lower incisors) are usually the first teeth to grow and usually occur between 6 and 10 months of age.
2. The growth of the two anterior teeth of the middle upper jaw (Upper incisors), which usually occurs between 8 and 13 months.
3. Then the later anterior teeth of the upper and lower jaw (Lateral incisor) usually grow between 8 and 16 months of age, in most cases the mandibular teeth tend to grow earlier.
4. The first and lower premolars milk teeth usually grow between the ages of 13 and 19 months.
5. Upper and lower jaw deciduous biting teeth (Cuspid) usually occur between the ages of 16 and 23 months.
6. Finally, the teeth of the molar milk mill grow between the ages of 25 and 33 months. Disorders in the development of deciduous milk teeth are diagnosed by delaying the eruption of each of these teeth, fewer of each of the above teeth, insufficient longitudinal growth of each tooth, severe loosening of the tooth that led to its fall, and abnormal tooth growth in its place.

Also malnutrition, vitamin D deficiency, and thyroid hormone disorders will also be considered in all infants. To measure the height and weight of each subject, the following standard procedures, were measured using digital weighing scale and anthropometric rod to the nearest 0.1kg and 0.1cm, respectively. Children whose weight for age was less than two Standard Deviations (SD) below the median were classified as underweight, children or wasted, respectively. Then the children in both groups were asked about secondhand smoking history and come with demographic information included age, weight, the number of teeth available, the time of eruption of each tooth, type of nutrition, history of dental development disorder in other children and parents educational level was registered in a special sheet. In this study, we included infants who were exposed at least three months with a smoker (father, mother or both). In terms of exposure, children were divided into three groups (Low:

consumption of less than 5 cigarettes in 24 hours by parents, Medium: consumption of 5 to 10 cigarettes in 24 hours and High: consumption of more than 10 cigarettes in 24 hours).

Descriptive statistics including mean and standard deviation, as well as relative frequency were used to describe the data. To examine the relationships and comparisons between the two groups, was used the chi-square test. Multivariate logistic regression was used to evaluate the odds of each of the variables. All analyzes were performed using SPSS software version 16. ($p < 0.05$) was considered to be significant. Sample size using Epi info 7.2 at a significant level of 5% and a power of 80%, equal to 103 people in each group and a total of 206 people.

Results

In this study, the mean age of patients was 37.6 ± 6.21 months

and the age group of 36-48 months with 43.1% had the highest frequency among children in both groups. It was also found that 53 children (22.7%) had no exposure to secondhand smoke or cigarettes. There was a significant difference between the two groups in terms of second-hand tobacco use ($P < 0.001$). The results of second-hand smoking among infants in both groups are shown in Table 1. In this study, independent variables with dental growth disorder of infants were examined in a multivariate regression model. As shown in Table 2, tobacco use variables had a significant relationship with dental growth disorder, both parents are smokers, the average smoking time is more than 12 months, gestational age of infant, high exposure of baby, and delayed growth of pre-molar and molar teeth and there was no significant relationship with other variables. The results of the multivariate logistic regression model are presented in Table 2.

Table 1: Frequency distribution of children based on the exposure to secondhand smoke.

Secondhand Smoking Exposure	Case Group Number (%)	Control Group Number (%)	Total Number (%)	P-Value
Without exposure	14 (13.6)	39 (37.8)	53 (25.7)	P<0.001
Low exposure	6 (5.8)	13 (12.6)	19 (9.2)	
Medium exposure	48 (46.6)	31 (30.1)	79 (38.3)	
High exposure	35 (33.9)	20 (19.4)	55 (26.7)	
Total children	103 (100)	103 (100)	206 (100)	

Table 2: Relationship between independent variables with delay in tooth growth in multivariate logistic regression model.

Independent Variables		Odds Ratio	95% Confidence	P- Value
Age category	12 to 30 month	1		
	Less than 12 years	1.089	1.342-0.0652	0.074
	More than 30 years	1.196	1.451-0.0912	0.055
Gestational age	> 36 weeks	1	1.189-0.857	0.093
	32-36 weeks	1.058	1.369-0.961	0.075
	28-32 weeks	1.188	1.845-1.372	0.001
	< 28 weeks	1.505		
Weight-For-Age	-2SDto 2SD	1	1.283-0.825	0.078
	>2SD	1.148	1.469-0.988	0.057
	<-2SD	1.264		
Type of nutrition	Breast milk	1	1.125-0.856	0.065
	Milk powder	1.103		
Smoker person	Father	1	1.423-0.971	0.053
	Mother	1.251	2.257-1.463	0.001
	Parents	1.723		
Mean duration smoking	Three months	1	1.448-0.911	0.075
	3- 12 months	1.205	1.739-1.186	0.037
	More than 12 months	1.484		

The rate of exposure of the baby	No exposure	1	1.193-0.855	0.083
	Low exposure	1.023	1.459-0.977	0.056
	Medium exposure	1.243	1.756-1.301	0.001
	High exposure	1.469		
Average delay in tooth growth	Less than 2 months	1	1.642-1.209	0.053
	2- 6 months	1.426	1.857-1.313	0.014
	More than 6 months	1.552		
Tooth type	Incisors	1	1.363-0.916	0.073
	Capsid	1.123	1.473-0.985	0.043
	Premolar	1.264	1.719-1.228	0.013
	Molar	1.418		
Tooth location	Lower jaw	1	1.282-0.857	0.079
	Upper jaw	1.058		
History of dental growth problems in a previous child	Negative	1	1.405-0.951	0.053
	Positive	1.249		

Discussion

The results of this study showed that, among the measured variables, secondhand smoking significantly increased the risk of delay in tooth growth in infants. The rate of this disorder is related to factors such as the simultaneous smoking of parents, the duration of smoking and also the daily consumption of cigarettes. This finding is consistent with the results of Carvalho JC [13]. Of course, given the limited scope of this study, the result cannot be attributed to the entire community, but it can highlight the importance of the need for greater attention and more comprehensive research. Smoking by parents during infancy can cause problems such as breathing problems, hypersensitivity, asthma exacerbations, mental development problems and delayed growth of infants and children [14]. Parents' smoking around their young children is declining in developed countries, but is strongly associated with cultural and economic poverty, and is on the rise in low-income or middle-income countries. Smoking is typically reported to be low in lactating women or women with young children. However, many infants are exposed to secondhand smoke that can affect their growing physical and mental health [15]. In some studies, exposure to second-hand smoking during infancy increases the risk of respiratory distress in infants by 23% and growth and developmental abnormalities by 13% and reduces infant weight gain [16,17]. One study also found a significant association between parental smoking and infant longitudinal growth limitation [18].

The study found that the younger the gestational age of baby (especially gestational age less than 28 weeks), the more likely it was that dental malformations will occur in the face of secondhand smoke. Perhaps the most important reason is the lower resistance

and safety of these children to the effects of cigarette smoke. Biological age may be effective in causing apoptosis of the tissues around the tooth and slowing their growth. Tobacco constituents enhance apoptosis in periodontal tissue. These findings are consistent with the study conducted by the Ramos SR et al. [19] and Kang SW et al. [20]. In this study, it was found that the growth of children's teeth exposed to secondhand smoke was significantly delayed, and this delay was greater in the premolar and molar teeth. In the study of Lee SI et al. [21] it was found that smoking in parents with complications of infancy, in particular, delays in the child's development, such as when to sit and walk the power of learning and completing the number of children's teeth, especially grinding teeth, is higher than that among normal people. In the study of S emlali A et al. [22] smoking daily increases the risk of delaying the growth of a child's first teeth, and smoking-related illnesses such as respiratory illnesses can be thought to exacerbate or exacerbate dental growth problems.

The study found that if both parents were smokers, they were much more likely to develop dental growth disorders. This is because children are more prone to secondhand smoke. A study by Riedel C et al. [23] among children with developmental disorders, such as problems with tooth growth, showed that the high prevalence of secondhand smoking was found to be similar to the results of this study. In this study, it was found that the effect of secondhand smoking on tooth growth in depending on the exposure to secondhand smoke was significantly different, as the amount of exposure increases (high exposure), the problems related to the growth of teeth increase significantly. The results of Zadzińska E et al. [24] were in perfect agreement, but the results of Hammond and Meeker's studies showed that rate of impairment

of dental growth was significantly higher even at moderate doses. This may be due to the type of participants selected or the sample size of the studies [18,19].

This study found an impact of secondhand smoking on incidence of tooth growth delay in various children's weight group; although the group of children who weighed less than the corresponding age group was higher, there was no significant difference between them. Children who are the right weight for their age are less likely to be affected by secondhand smoke due to a better and more complete immune system. This finding is inconsistent with the findings of Li MY et al. [25] study, which found that children's weight did not affect their susceptibility to the effects of cigarette smoke, which may be due to their choice of children to study [25]. The results of this study showed that by increasing the duration of smoking by parents (especially more than one year), the likelihood of delayed dental growth increases. It was also found that if a child is high exposed to secondhand smoke, the chances of delaying tooth growth are much higher. This finding is consistent with the results of Ershoff DH et al. [11] and Huang R et al. [12] studies but contradicts the findings of the Molnar study that increase in exposure to secondhand smoke has not had a significant effect on delayed tooth growth, which may be due to differences in children's choice or sample size [18]. In reviewing the logistic regression model regarding factors affecting delay of tooth growth, it was found that secondhand smoking (odds ratio, OR=1.5) increased the chance of tooth growth delay. These findings are consistent with the results of Zadzińska E et al. [24] and with the results of Li MY et al. [25] and Williams SA et al. [26] to some extent. The most important reason for the incomplete outcome of these results may be the type of study designed or the sample size to be evaluated.

Conclusion

The results of this study showed that the rate of delayed dental growth in the group of children with smoking parents is relatively high. It has also been shown that second-hand smoking can increase the likelihood of delayed dental growth. Because second-hand smoking increases children's dental development problems, controlling and reducing smoking during pregnancy and lactation may significantly reduce the incidence of pediatric dental complications. Therefore, in order to control and prevent the inappropriate growth of teeth in children due to smoking by parents, it is necessary to emphasize the non-smoking during pregnancy and lactation by parents and relatives. It is also important to improve the attitudes and actions of parents and their loved ones about the effects of smoking or smoking around young children.

Limitations

One of the limitations of this research is the self-report of parents in smoking, as well as children's dental disorders, and

especially the delay in tooth growth, which has sometimes not been enough. This problem has been largely solved by justifying parents and repeating the question. Another limitation is that insufficient data on the dose were not available to assess the dose-response relationship and the time it took for cigarette smoke to assess the extent of the damage. Also, the cases in the two groups were divided only in terms of the history of delay in tooth growth, and in other cases, the matching between the two groups was not performed.

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