Original Article

Evaluation of the Relationship between Passive Smoking and Oral Pigmentation in Children

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Abstract:

Introduction: Melanin pigmentation in the oral mucosa occurs as a result of several reasons one of which is smoking. Cigarette smoke induces numerous side effects in the people who do not smoke, but are in the same environment. The aim of this study was to evaluate the role of parental smoking on pigmentation of their children's oral mucosa.
Materials and Methods: This study was carried out as a historical cohort. Participants were 400 healthy children, 10 to 11 years old who did not use any drugs. The passive smoker group included 200 children who at least one member in their family was a smoker. The control group included 200 children who did not have a smoker in their family. Furthermore, two groups were matched in the point of view of skin color. The children in the two groups were examined and oral pigmentation was recorded. Finally, the results were analyzed by the chi- square test.
Results: Pigmentation was seen in 150 children (75%) in the experimental group and 122 children (61%) in the control group ($P<0.005$). The relative risk of oral pigmentation for children who were exposed to passive smoking was 1.23.
Conclusion: Based on the results of this study, passive smoking can induce gingival pigmentation in children.

Key Words: Passive Smoking; Skin Color; Oral Pigmentation; Physiologic Pigmentation

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INTRODUCTION

Pigmentation is a kind of discoloration of the oral mucosa and gingiva that interfere with esthetics of which melanin pigmentation is the most common form. Several local and systemic factors cause melanin pigmentation in the oral mucosa, including physiological or racial pigmentation, smokers melanosis, pigmented nevus, melanotic macula, Addison disease, Peuutz-Jeghers syndrome, HIV infection and drugs such as minocycline and anti- malarial drugs [1].

Researches have shown that the maximum frequency of oral pigmentation is seen in the

Indians (89%) and the minimum frequency is detected in the Europeans (15%) [2,3]. Presence of melanin pigmentation of the oral mucosa has unfavorable effects on esthetics; furthermore, considering the fact that melanin pigmentation may be a clinical manifestation of systemic diseases and drug usage, this sign is very important in the differential diagnosis of these conditions [4]. One of the recognized phenomenon in smokers is the appearance of melanin pigmentation which is called smoker's melanosis.

This pigmentation may be induced by the stimulation of melanocytes by stimuli present in tobacco smoke such as nicotine and benzopyrene. It seems that there is a cause and effect relationship between cigarette smoke and this kind of pigmentation because as the number of years the person has quit smoking increases, the pigmentation decreases too [5]. But the cigarette smoke has effect on other people who are present in the same atmosphere. Researchers have also shown a relationship between passive smoking and some side effects such as appearance of childhood asthma [6] dental caries [7], spontaneous abortion [8], periodontal disease [9]), children's behavior problems and childhood cancers [10]. The children who are exposed to cigarette smoke usually do not complain and when they express their complaints the parents do not pay attention to them or reprimand. So children suffer from environmental tobacco smoke and the house is the most important site of this exposure [10]. Recently, a research in Japan shows an increase in melanin pigmentation occurrence in the children whose father or mother are smokers [5].

We did not find a related article in Iran or other countries.

A high percentage of people in our country smoke cigarettes and they may not pay attention to it is injurious effects in children, so we designed this study to evaluate the relationship between passive smoking and oral pigmentation in children.

MATERIALS AND METHODS

This study was performed as a historical cohort. In the examination of children in primary schools in Tehran, two-hundred 10 to 11-year-old children from four schools were selected in whom at least one of their family members were smokers.

A person was interpreted as a member of a smoker family when at least a member of the family had smoked a cigarette once at home in the presence of children since 6 months ago.

It was registered according to the childrens' answers. These children were completely healthy and did not use any medications such as drugs that induce pigmentation.

We also chose 200 children from these schools with the same health condition and the same age without any smoker family members as the control group. Nobody of this group was continuously exposed to cigarette smoke outside home; for example presence in the parent's office or school service.

Distribution of age and gender and also skin color were similar in both groups. Nivea make up cream was used as an index for classification of skin color. In this case, skin color number 4 or lighter was classified as the fair group and skin color number 5 or darker was classified as dark (11). Then both were examined for the presence of melanin pigmentation on the gingiva.

The pattern and location of pigmentation were registered. Then both of them were examined for the presence of macules of melanin pigmentation on the gingiva and the pigmentation pattern and localization were registered. If there was no pigmentation macule, the grade was 0 and if there was single and separate units of pigmentation, the grade was 1.

If at least in one region, a continuous band

between two separate units was seen, the grade was reported as 2. The Chi-square test was used for statistical analysis.

RESULTS

In this research, 400 children (200 girls-200 boys) with 10-11 years of age were examined in two groups of control and passive smokers. The age and gender and skin color (darkness and brightness) of the two groups were similar. One-hundred twelve cases (56%) were fair skin colored and 88 cases (44%) were dark skin colored. Nobody was black descent and all of the children were caucasian. Of the children who were not exposed to passive smoking, 122 cases (61%) had oral pigmentation and of the children who were exposed to passive smoking, 150 cases (75%) had oral pigmentation.

The chi-square test showed that this difference is statistically significant ($P<0.0050$). For the children who were exposed to passive smoking, the relative risk was 1.23 and the attributed risk of oral pigmentation in passive smokers was 14%. Furthermore, separation of the children with light and dark skin from the view point of the effect of passive smoking and oral pigmentation (Mandle-Hanzel) test revealed that children with fair skin who were exposed to passive smoking were susceptible to oral pigmentation and this situation does not happen in children with dark skin ($P<0.000$) and the relative risk of oral pigmentation in children with fair skin is 1.7. The attributed risk of passive smoking factor for the children with fair skin is 26.8% higher than dark skinned children. The difference between the two groups from the view point of the model of oral pigmentation showed that the passive smoking group exhibited grade two, which was less than the control group, 65.5% against 75.5%, but this difference is not significant statistically ($P<0.1$). Evaluation of the location of pigmentation showed that the anterior part of the jaws was the most common place of pigmentation which was nearly the same in both groups.

DISCUSSION

This research showed that the prevalence of gingival pigmentation in children whose Parents smoke at home is higher than the other children. This result confirms the result of the research proposing that cigarette smoke effects the color of children's gingiva [5]. The above research was performed on children who were referred to a pediatric clinic in Japan. Results of this study showed that pigmentation was seen more in children whose parents were smokers compared to non-smokers. In our study, the time that children were exposed directly to cigarette smoke was not cited, but in all cases of the passive smoker group there was at least one person who smoked in the presence of the child, so we expect that these children were affected by smoke at home for a long time. In this study, the children were divided into two groups based on the children’s explanation regarding their parents smoking. Although it seems that the parents’ explanation should be more reliable, considering the results of a research in Turkey representing disagreement between the amount of nicotine metabolites in the children's blood and urine and the parents' claims [10] we supposed that the children who are 10-11 years old may be more reliable than the parents who may give unreal information because of their social position. Anyway, this point is one of the limitations of this study. The present study was performed with a high sample size and we chose the control group with the same gender, age and skin color as the passive smoker group, so we considered an important factor such as skin color which is very different in Iranian people. We also considered the other metabolic factors accompanying oral pigmentation. Paying

attention to other sources of cigarette smoke in the children's environment as an interference variant, strengthens the results of the results of this study. A known mechanism which explains the increase in mucosal pigmentation by smoking is that polycyclic amines such as nicotine and benzopyrene which present in the smoke are stimulant factors for melanin production; therefore, gingival melanocytes are sensitive to cigarette smoke. There are two original ways for the stimulant materials in cigarette smoke to reach the gingival melanocytes. The first way is from the mucosa and saliva and the second way is the systemic route which occurs through blood circulation, so the majority of smoke enters the blood circulation by breathing through the nose effecting the melanocytes indirectly, so the second way is a more acceptable explanation [1,5,12]. It is suggested that the melanin which is in the oral mucosa may exert its protective effect on the mucosa by joining with poisonous material in cigarette smoke or food that can penetrate in the tissue (13). In this way, these stimulant factors may enter the mucosa and blood and effect children similar to the smoker. By considering this point that breathing in children is faster than the adults, probably this effect is faster and more severe in children (14). Dividing children into two groups according to skin color showed that the effect of cigarette smoke on oral pigmentation is related to children with fair skin and this effect is not seen in children with dark skin. We did not find any research that pointed to the different effect of cigarette smoke in people with dark skin and light skin. By considering the protective effect of melanin against toxic material the question that "does melanin decrease in the skin relate to the reduction of defensive ability against injurious and poisonous materials in cigarette smoke?" arises. And "is gingival pigmentation in children with light skin a compensative reaction against lower melanin in their skin?" The results of this study showed that the anterior part of the mandible and the anterior part of the maxilla are involved more than the other areas and this arrangement was similar in the two groups and this result confirms the results of previous studies that had been performed in adults [2,3,13]. Hanioka et al stated that the pattern of pigmentation is grade 1 in the presence cigarette smoke. In our study, the number of children whose pigmentation was grade 1 were more in the passive smoking group, but this association was not statistically significant.

Today there is more attention towards the effects of passive smoking in children and now the present research shows its effect in the oral mucosa.

In spite the fact that melanocytes are normal cells in the human gingiva and that there is a relationship between skin color and gingival pigmentation, gingival pigmentation in children is not necessarily a sign of their parents smoking.

But gingival pigmentation in children may be an alarm for their family.

CONCLUSION

Based on the results of this study, passive smoking may induce gingival pigmentation in children.

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REFERENCES

1- Cicek Y, Ertas U. The normal and pathological pigmentation of oral mucous membrane: a review. J Contemp Dent Pract 2003 Aug 15;4(3):76-86.

2- Hedin CA. Smokers' melanosis. Arch Dermatol 1977 Nov;113(11):1533-8

3- Hedin CA, Axell T. Oral melanin pigmentation in 467 Thai and Malaysian people with special emphasis on smoker's melanosis. J Oral Pathol Med 1991 Jan;20(1):8-12.
4- Lewis RE. Burkets oral medicine: diagnosis & treatment. 10th ed. BC Decker Inc 2003;chap 15:127,132.
5- Hanioka T, Tanaka K, Ojima M, Yuuki K. Association of melanin pigmentation in the gingiva of children with parents who smoke. Pediatrics 2005 Aug;116(2):186-90.
6- Fernando D, Martinez MD, Cline M. Increased incidence of asthma in children of smoking mothers. Pediatrics 1992;89:21-8.
7- Aligne CA, Moss ME, Auinger P, Weitzman M. Association of pediatric dental caries with passive smoking. JAMA 2003 Mar;289(10):1258-64.
8- George L, Granath F, Johansson AL, Annerén G, Cnattingius S. Enviromental tobacco smoke and risk of spontaneous abortion. Epidemiology 2006 Sep;17(5):500-5.
9- Arbes SJ Jr, Agustsdottir H, Slade GD. Enviromental tobacco smoke and periodontal disease in the United States. A J Public Health 2001 Feb;91(2):253-7.
10- Boyaci H, Etiler N, Duman C, Basyigit I, Pala A. Enviromental tobacco smoke exposure in school children: parent report and urine cotinine measures. Pediatr Int 2006 Aug;48(4):382-9.
11-Jahangiri L, Reinhardt SB, Mehra RV, Matheson PB: Relationship between tooth shade value and skin color: an observational study. J Prosthet Dent 2002 Feb;87(2):149-52.
12- Marakoglu K, Gursoy UK, Toker HC, Demirer S, Sezer RE, Marakoglu I. Smoking status and smoke-related gingival melanin pigmentation in army recruitments. Mil Med 2007 Jan;172(1):110-3.
13-Unsal E, Paksoy C, Soykan E, Elhan AH, Sahin M. Oral melanin pigmentation related to smoking in a Turkish population. Community Dent Oral Epidemiol 2001 Aug;29(4):272-7.
14-Thaqi A, Franke K, Merkel G, Wichmann HE, Heinrich J. Biomarkers of exposure to passive smoking of school children: frequency and determinants. Indoor Air 2005 Oct;15(5):302-10.