

# Evaluation of the Effect of Parental Smoking on Gingival Melanin Pigmentation in Children

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## ABSTRACT

**Background:** The presence of melanin pigmentation of the gingiva has unfavorable effects on esthetics in children. Although there are several local and systemic factors that cause melanin pigmentation, they may also be induced by the stimulation of melanocytes by stimuli present in tobacco smoke.

**Aim:** The aim of the study was to correlate the effect of parental smoking on the pigmentation of gingiva in children of Modinagar, Uttar Pradesh, India.

**Materials and methods:** The study was a cross-sectional observational study. The study sample was formed by all children between 8 and 14 years of age. Only medically compromised children were excluded from the study. The children were examined for the presence of gingival melanin pigmentation. The status was recorded as present or absent. Determination of the smoking status of family members was done by a self-formulated questionnaire.

**Results:** The presence of pigmentation was seen in 114 (82%) children, whereas pigmentation was absent in 26 (18%) children. Out of the total sample of 140 children, 95 had one or more family members who were smoking. The Chi-squared test performed to form an association between pigmentation and the type of tobacco used revealed high significance ( $p = 0.00$ ) for the father who smokes bidi.

**Conclusion:** There is a correlation between parental smoking and melanin pigmentation in the gingiva of children, and the correlation is very high when the father is a smoker, especially when he smokes bidi.

**Keywords:** Gingival pigmentation, Melanin pigmentation, Parental smoking.

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## INTRODUCTION

Smoker's melanosis is a recognized phenomenon in smokers in which there is an increase in gingival melanin pigmentation.<sup>1</sup> Nicotine, cotinine, and other volatile chemicals, including acetaldehyde and acrolein, build as a result of long-term smoking exposure.<sup>2</sup> The inhalation of tobacco smoke in the air, known as passive smoking, secondhand smoke, or environmental tobacco smoke (ETS), consists of 15–20% mainstream smoke (smoke exhaled by the smoker) and 80–85% sidestream smoke (smoke from the burning tip of a cigarette).<sup>3</sup>

Research shows that the maximum frequency of oral pigmentation is seen in Indians (89%). The incidence of smoking in the Indian population has been found to be 47% in men and 14% in women.<sup>4</sup> Due to the lack of stringent "smoke-free" rules in India, children who have a smoker in the household are more likely to develop gingival pigmentation.<sup>5</sup>

The presence of melanin pigmentation in gingiva has unfavorable effects on esthetics. Individuals complain about an unhealthy, dirty, and dark appearance of the gingiva, the mismatch of gingival color with that of skin or teeth, and lowered self-esteem.

The literature contains very few studies assessing smoking's impact on gingival pigmentation. Therefore, the purpose of this study is to determine how parental smoking affects the gingival pigmentation of children in Modinagar, Uttar Pradesh, India (Table 1).

## MATERIALS AND METHODS

The study was a cross-sectional observational study. The ethical clearance was obtained from the ethical committee of the Institute of Dental Studies & Technologies, Ghaziabad, Uttar Pradesh,

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India. Informed consent was obtained from the parents before the commencement of the study. At 80% ( $1 - \beta$ ) power of the investigation, 140 was the minimum suggested sample size to detect the statistical significance of 5% ( $\alpha = 0.05$ ) and effect size ( $f$ ) 0.39 using G\*Power 3.1.

**Table 1:** Association between pigmentation and individual smoking (father, mother, or associated family member)

	Father	Mother	Associated family member
PP Smoking	58	19	39
PP Nonsmoking	56	95	75
PA Smoking	18	0	24
PA Nonsmoking	8	25	19

PP, pigmentation present; PA, pigmentation absent

The study sample was formed by all children between 8 and 14 years of age reporting to the outpatient department of the dental college and associated hospital. The study excluded children who were medically compromised. The children underwent examinations to check for gingival melanin pigmentation. The status was noted either as present or absent.

**Evaluation of Gingival Pigmentation**

If single pigmentation units or the creation of a continuous ribbon extending from two adjacent units were seen, the pigmentation was considered to be present. The pigmentation was marked absent in cases where there was no pigmentation.

**Evaluation of Smoking Status**

Family members’ smoking status was ascertained using a self-created questionnaire. The questionnaire’s reliability, as determined by Cronbach’s  $\alpha$ , was 0.82, and its face validity was 0.73. When at least one family member smoked once a day at home in the child’s presence during the previous 6 months, the child was considered to be a part of the smoker family. Face-to-face interviews of the father, mother, and grandparents, if living together, were carried out by a single examiner.

**RESULTS**

Out of the 140 children, 56 (40.3%) were girls, and 84 (59.7%) were boys, with a mean age of 11.13 years.

The presence of pigmentation was seen in 114 (82%) children, whereas pigmentation was absent in 26 (18%) children.

Out of the total sample of 140 children, 95 had one or more family members who were smoking.

Among the pigmentation present (PP) group, 58 fathers, 19 mothers, and 39 associated family members were found to be smokers.

Among the pigmentation absent (PA) group, 18 fathers and 24 associated family members were found to be smokers. None of the mothers were found to be smokers in the group.

An association between pigmentation and combined smoking was made, and the result showed high significance ( $p = 0.05$ ) when at least one member of the family had a smoking habit. The odds ratio was found to be 3.167 (Fig. 1).

The Chi-squared test performed to form an association between pigmentation and the type of tobacco used revealed high significance ( $p = 0.00$ ) for the father who smokes bidi (Fig. 2).

**DISCUSSION**

Pigmentation of the gingiva may be due to a physiological or pathological cause. The level of melanin pigmentation can change depending on a person’s age, gender, skin tone, race, lifestyle, and a few other environmental variables.<sup>6</sup>

Children whose parents smoked had higher levels of pigmentation than children whose parents did not smoke.

There are primarily two ways that stimulatory compounds from passive smoking get to the melanocytes<sup>7</sup>:

- By inhaling the smoke, nicotine and its byproducts cause an increase in the activity of melanocytes.
- Dissolving in the saliva affects the oral epithelium.

In the present study, 40.3% of girls and 59.7% of boys had pigmentation, which shows a slight predilection of gingival melanin pigmentation in boys.

Hanioka et al. conducted a case-control study in the Japanese population and found that children with gingival pigmentation had

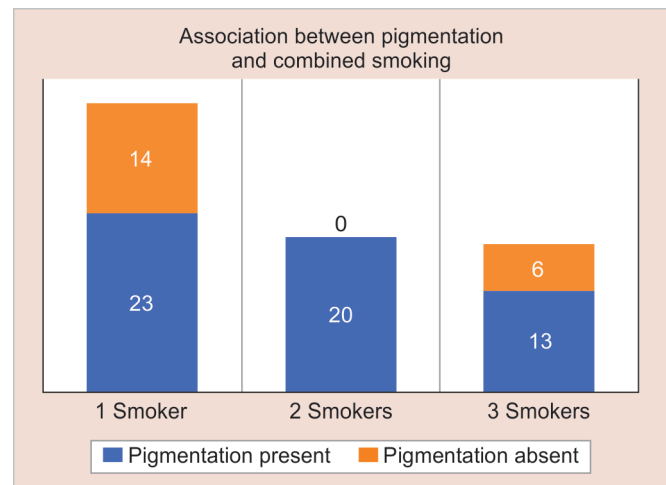


Fig. 1: Association between pigmentation and combined smoking

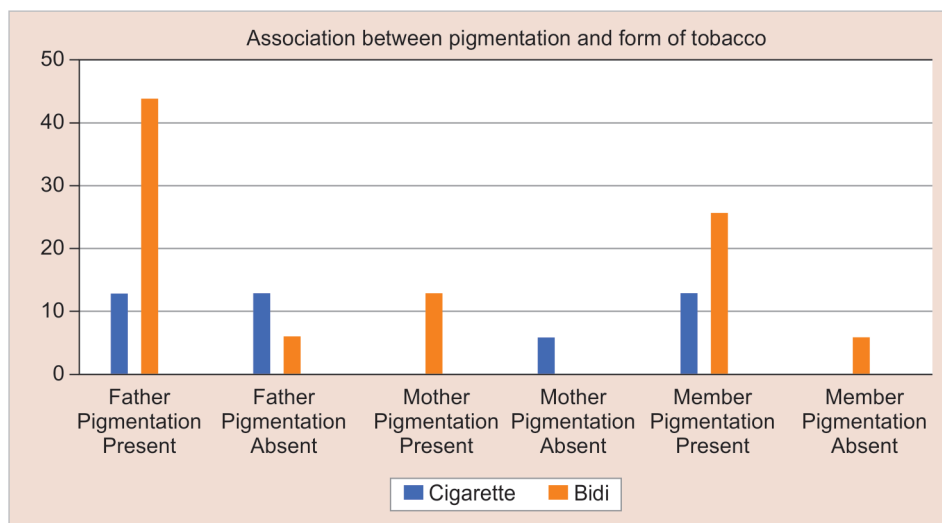


Fig. 2: Association between pigmentation and form of tobacco use

a higher percentage of parental smoking (70–71%) than children without pigmentation (35%).<sup>8</sup>

In Turkey, Boyaci et al. assessed the levels of nicotine metabolite in children's blood and urine and discovered a strong link between gingival pigmentation and passive smoking.<sup>9</sup>

The precise amount of time that smoking parents and their children spent together was not accessible for this study's data. Nonetheless, the majority of parents smoked 6 to 10 cigarettes a day, making them moderate to heavy smokers; as a result, it's possible that their children were exposed to passive smoke.

In the present study, along with the impact of the smoking habit of the father, the habits of the mother and other family members (i.e., grandparents and other relatives in the case of a joint family) were also included, although a significant association was not found.

Additionally, the present study also assessed whether the type of tobacco consumption, such as cigarettes, bidis, and other products, also had any association with pigmentation. It was observed that parental bidi smoking had a greater association with gingival pigmentation than other forms of tobacco products. Bidi contains more particulate matter as they do not have filters, along with a higher amount of nicotine, compared to cigarettes.

Parents' smoking had a discernible effect on their children's gingival pigmentation, although it was unclear how much more melanin was formed as a result. A stronger correlation between melanin pigmentation in human gingiva and passive smoking could be established by conducting additional investigations utilizing quantitative analysis regarding the effects of ETS and gingival pigmentation. Even while it is suggestive of parental smoking, the higher pigmentation in participants exposed to ETS from smoker parents is not conclusive.

## CONCLUSION

Our cross-sectional study's findings lead us to the conclusion that there is a link between parental smoking and melanin pigmentation in children's gingiva, and that association is strongest when the father smokes, particularly when he smokes bidi.

## Clinical Significance

The study emphasizes the harm passive smoking causes to youngsters, and further research may be done to understand the

various harmful impacts of smoking. This study will be useful in creating awareness and counseling to adults regarding the ill effects of smoking with regard to the impact on children.

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