

An Investigation into Black Tooth Stain Among School Children in Chakkar Ka Milak of Moradabad City, India

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ABSTRACT

Background: Tooth discoloration is a frequent dental finding associated with clinical and esthetic problems. It differs in etiology, appearance, composition, location and severity. During routine school dental camps we found that there is black discoloration of tooth in children in a particular area of Moradabad city.

Objective: To assess the prevalence and to investigate the reasons for the black stains among school children of Moradabad city.

Methods: Three schools present in the municipal ward were selected for the study. All the children studying in the above schools were subjected to Type III investigation to identify the black stains. Out of 780 children 156 students showed black stains. Among them a sample of black stain scraping was taken from 5 students and it was subjected to analysis for trace elements. Trace elements analysis was done by (ICP) *Inductively Coupled Photo spectrometry*.

Results: Out of 5 scrapings 3 showed presence of ferrous ions of about 2.56%, calcium ions 17.15% and magnesium ions 0.72%, while the remaining 2 samples showed calcium 14.86%, magnesium ions 0.82% and no presence of ferrous ions.

Conclusion: Black extrinsic tooth stains were shown to be a form of dental plaque. The stains examined contained a black insoluble ferric compound.

Keywords: Black tooth stains

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The oral cavity plays an important role in the protection and preservation of systemic health; it is involved in nutritional intake, communication, and host defense. The teeth are involved in all 3 roles, and dental diseases can be a source of multiple problems, including oral and systemic infections and difficulty in chewing, swallowing, or phonation. Tooth discoloration is a frequent dental finding associated with clinical and esthetic problems.(1) It differs in etiology, appearance, composition, location, severity and degree of adherence. Basically there are two types of tooth discoloration:

those related to intrinsic factor such as congenital or systemic influence or those caused by extrinsic factor related to metallic or non-metallic stains.(2)

Attraction of material to the tooth surface plays a critical role in the deposition of extrinsic dental stains. However the mechanism that determines the adhesion strength is not completely understood. The science of colour is important in dentistry with regard to colour perception and description, and can be improved with training. The viewing conditions

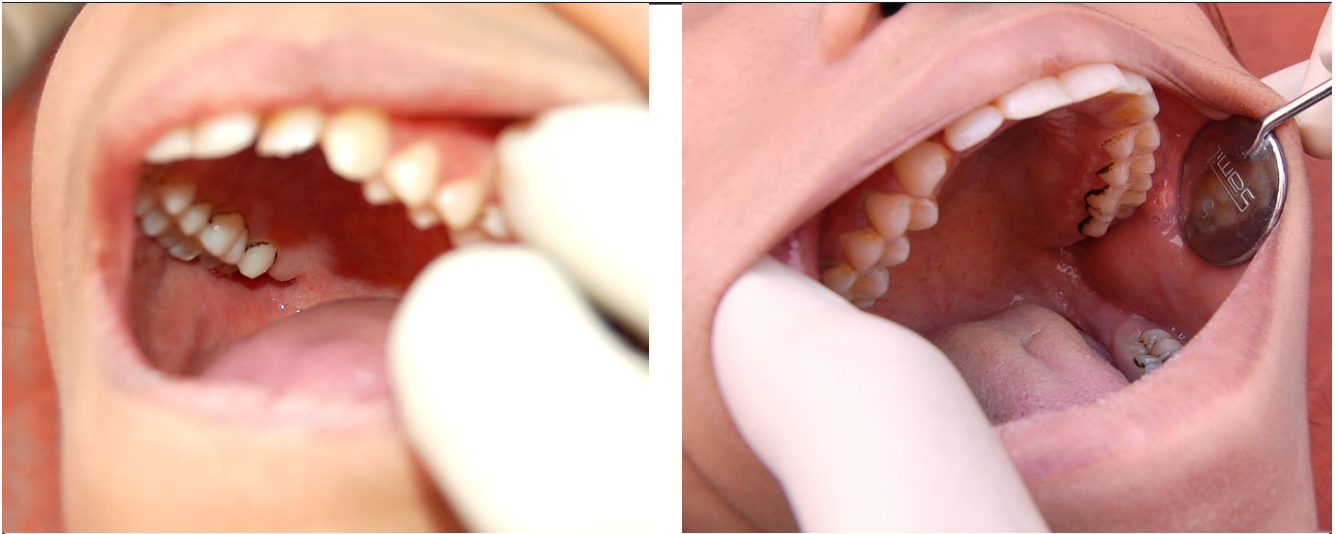


Fig. 1. Black stains on palatal surface of maxillary molars

are extremely important and variables such as the light source, time of day, surrounding conditions and the angle of tooth viewed affects the apparent tooth colour. Light is composed of differing wavelengths and the same tooth viewed under different conditions will exhibit a different colour, a phenomenon known as *metamerism*.⁽³⁾

Studies focusing on black extrinsic stains are scarce in scientific literature. This particular type of pigment has been considered to be special form of dental plaque because it contains insoluble iron salt and a high content of calcium and phosphate. Black stains may be clinically diagnosed as pigmented dots, lines or continuous lines which rarely go beyond the cervical third and counter the crown around the gingival third, not exceeding to the proximal areas.

The present study is designed to identify the nature of the

pigment in black extrinsic tooth stains in the school children of Moradabad city.

Aims and Objectives

To investigate the reason for the black tooth stains among school children residing in Chakkar Ka Milak of Moradabad city, U.P.

Material and Methods

10 Schools were present in the municipal ward of Chakkar Ka Milak and 3 schools were randomly selected for the study. All the children studying in the above schools who are the resident of that ward were subjected to oral examination with a mouth mirror and explorer in the natural light to identify the black tooth stains showed in figure 1. The criteria for diagnosis of black stains were according to *Koch et al* (2001),⁽²⁾ Presence of dark lines forming a linear discoloration parallel to the

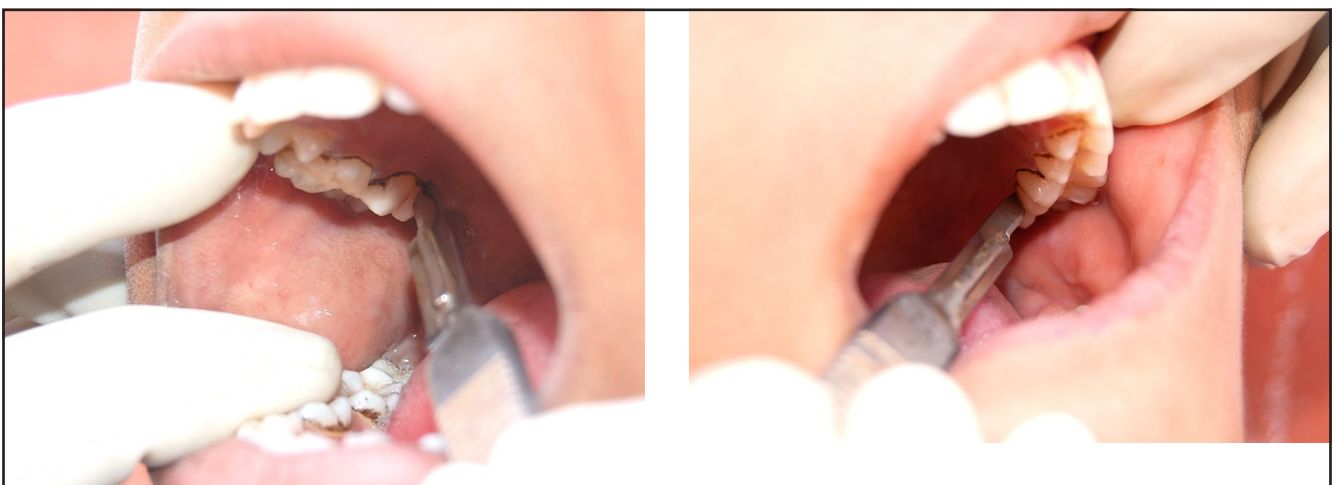


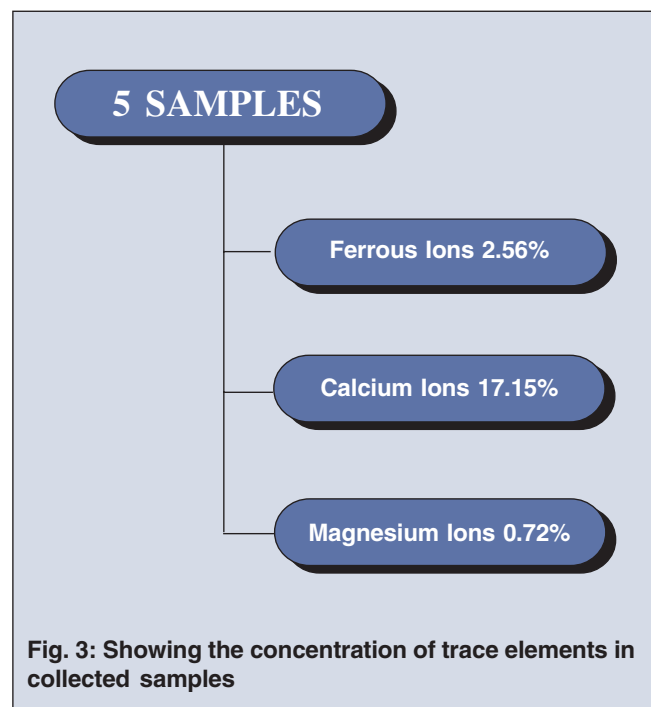
Fig 2: Scraping of black stains from palatal surfaces of maxillary molars

gingival margin of at least two permanent teeth. 780 school children with an age group of 12 to 15 years were examined (474 males and 306 females). Out of 780 children, 156 showed black tooth stain. Among them a sample of black stains scraping was taken from 5 students using a sterile BP blade. The material was a mixture of debris, plaque and black stains. The gingival material was carefully removed to avoid bleeding, as the constituents of blood would affect the results. Small plastic containers kept at 20°C were labeled separately to store the samples from each subject. Trace elements analysis was done by (ICP) Inductively Coupled Photo spectrometry in metal handicrafts and research centre, Moradabad. The sample of drinking water taken in a plastic container was also subjected for analysis to find out the trace elements.

Results

The black stains are characteristically found as a thin line in close proximity and closely following the contour of gingival margin of both the buccal, lingual or palatal surfaces of posterior teeth in particular. The prevalence of black tooth stains was found to be 20% out of which 52.5% were males and 47.4% females. The black material was a mixture of debris and plaque containing Calcium, Magnesium and Ferrous ions showed in Fig. 3.

The remaining two samples showed calcium 14.86%, magnesium .08% and no ferrous ions were present. Water analysis shows the presence of ferric ions of about 1.2mg/lit which is more than the tolerable dose that is 0.3mg/lit prescribed by *Indian Standard Drinking Water – Specification*.(4, 5)



Discussion

Most of the studies conducted on black stains occurred during the 1960s and 1970s. Nevertheless scientific evidence has demonstrated some relevant aspects on this issue. The studies focusing on black stains are scarce in recent scientific literature. This particular type of pigment has been considered to be a special form of dental plaque that differs from other types because it contains insoluble iron and high content of calcium and phosphate.(2) *Sutcliffe*, (1967) reported a prevalence of 21% of black stains in a population of nearly one thousand children aged 11 to 13 years. According to *Koch et al*, (2001) the prevalence of 19.9% has been reported among school children from Switzerland ages 7 to 15 years and prevalence of 4.6% was observed in school children aged 6-10 years in Germany. Brazilian studies report a prevalence of 7.3% of black stains among 3-5 years from different areas of the country. *Koch et al* in Italy observed 6.3% prevalence of black stains in a population of the same age range in Switzerland.

The Morphological studies of black stains confirm that it is a form of bacterial plaque. The result obtained in this study was in agreement with the previous study that reported that the pigment found in black stains is a black insoluble ferric compound, probably ferric sulfide.(6) There was no evidence for the presence of such a compound in debris or plaque from normal individuals. An iron compound generally stains teeth black. The findings indicate that ferric sulfide was found to be the cause of black staining material in plaque. The water sample examined was correlated with that of result found in tooth stains analysis and it was concluded that increased concentration of iron might be the reason for black tooth stains.

Conclusion

Black extrinsic tooth stains showed to be a form of dental plaque. The stains examined, showed a black insoluble ferric compound. The compound is thought to arise by the interaction of hydrogen sulfide produced by the bacteria in the periodontal environment and iron in saliva or gingival fluid. Further studies are necessary, if there is to be a more detailed understanding of factors which give rise to extrinsic black tooth stains.

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