

Black Stain in Adult: A Case Report

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Abstract

Black stain (BS) is a specific type of extrinsic dyschromia caused by the presence of chromogenic bacteria in the oral cavity, which occurs more frequently in children, but may also occur in adults. This article shows a case of black stain in an adult woman and treatment to remove it.

Keywords: Black stains, Discolorations, Chromogenic bacteria, Extrinsic stain, Tooth stain, Chromogenic bacteria.

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INTRODUCTION

Dental dyschromia is one of the main aesthetic enemies of smiles and is classified into intrinsic and extrinsic pigmentations.

Intrinsic pigmentations are much more severe than extrinsic pigmentations, since they involve the deep surface of the tooth under the enamel: dentin. It therefore implies a change in the composition of the structure or thickness of the dental hard tissues [1].

Some of these pigments are associated with the consumption of certain substances, but there are others associated with particular anomalies in the natural remineralisation of the tooth, genetic diseases or an excess in the acquisition of fluoride.

Extrinsic pigmentation is located on the outer surface of the tooth, namely on the enamel layer. It is due, for the most part, by the chromogens contained in food and drink that are deposited on the enamel.

A specific type of external discoloration is called black stain (BS) which is an alteration of the colour of dental plaque, caused by sediments deposited on the surface of the tooth, capable of altering the colour of the tooth. It is black, of microbial, food and iatrogenic origin. In the literature we can find it as "Black Extrinsic Stain". It is presented as dots or lines through the gingival edge of the teeth, both in the temporary and permanent dentition, and rarely affecting a single tooth [2].

This black tooth pigmentation has often been associated with a low caries experience. It is claimed

that there is a negative correlation between the presence of this pigmentation and the severity of caries [3].

They were described by Wilkins as black spots with a linear appearance and which also present points of incomplete coalescence, characteristic of such pigmentation, which rarely extend beyond the cervical third of the crown, but which may also affect the base of the grooves and the dental pits.

Koch simplified the manner for measuring this by classifying extrinsic tooth stain into three levels.

The first type corresponds to fine lines with incomplete parallel coalescence in the gingival margin, the second to easily observed continuous lines limited to the cervical third of the tooth, and the last to extensive staining over the cervical third of the tooth [4].

CASE REPORT

A 62-year-old woman shows up in dental clinic. Questioning indicated that the patient was in excellent health, does not smoke and does not drink alcohol. There was no history of any systemic disease.

We notice the vestibular surface of teeth with the black stains above at mesial of the central, lateral and canine incisors lower and less at distal of these teeth. The upper central and lateral incisors have stains that can be traced back to the black stains but with less intensity (Figure-1).

We also notice lingual surface of teeth the black stains with greater intensity to mesial of the lower canine and to mesial of the lower left premolar.

These black stains can be classified as type 3 according to Koch's classification



Fig-1



Fig-2

The treatment used for the removal BS, which is quite difficult with home techniques, consists of the professional oral hygiene session using ultrasound, air flow with the use of erythritol, and finally polish with polishing pastes and rubbers. After the oral hygiene session lasting 45 minutes the patient no longer shows the black stains (Figure 3 & 4).



Fig-3



Fig-4

DISCUSSION

The pigment of the BS is formed by a black insoluble ferric compound, probably ferric sulfide deposited on the tooth surface and formed as a result of the chemical reaction between the hydrogen sulfide, produced by chromogenic bacteria (anaerobic bacteria) and the excess of iron present in the saliva. The iron/copper and sulphur complexes are therefore considered to be responsible for the dark colour.

It has now been established that the high concentration of available iron is due to homeostasis disorders of the iron caused also by inflammatory processes. In the presence of IL-6, pro-inflammatory cytokine, iron is accumulated in cells and secretions.

The accumulation of iron ions, besides causing bacterial multiplication, superoxide formation and cell damage associated with destructive pathological inflammation, can react with hydrogen sulfide synthesized by anaerobic bacteria, forming iron sulfides.

In physiological situations, the concentration of available iron in tissues and secretions is 10-18 M and therefore very far from that necessary for bacterial replication and the consequent formation of iron sulphides. In pathological situations, however, the iron available in tissues and secretions is greater than 10 μ M and therefore sufficient for microbial replication and pigmentation formation [5].

The development of a chromogenic microbiota can be encouraged by the regular consumption of iron-rich foods and vitamin supplements containing ferric ions during pregnancy or early childhood [6].

The black pigmentation, as well as the development of various colourings or pigmentations on the surface of the teeth, is also due to the proline rich salivary proteins, which have a high affinity for binding with phenolic and polyphenolic compounds widely

present in plant foods and beverages, including red wine, and the ultrastructural examination of the BS revealed the presence of microorganisms incorporated into the matrix, almost all of which are Gram-positive species.

Recent PCR analyses of plaque samples in children with BS have also shown a significantly higher number of *Actinomyces naeslundii* and a lower number of *Lactobacillus* spp. than non-pigmented plaque samples [7].

PCR study designed to determine the presence of periodontal bacteria in BS showed that *Porphyromonas gingivalis* and *Prevotella melaninogenica* were absent in black deposit; however, *Actinomyces* spp. and *Aggregatibacter actinomycetemcomitans* were prevalent in BS patients. This may suggest that these bacteria are involved in the formation of BS. Another PCR analysis investigated BS samples for *Prevotella nigrescens*, *Prevotella intermedia*, *Actinomyces* spp., and *Streptococcus mutans*. The most recent PCR study confirmed that *Actinomyces naeslundii* is more prevalent in BS patients. On the contrary, *Lactobacillus* spp. and *Fusobacterium nucleatum* can be found in higher numbers in subjects without BS. (8)

Few authors attempted to find correlations between sex, age, diet, oral hygiene, socioeconomic status, medications, and BS prevalence [9].

Dietary habits may also play a role in the etiology. Consumption of vegetables, fruits, dairy products, eggs, and soy sauce promotes BS development. Children who had never been fed with nursing bottle tend to have higher BS occurrence. Drinking tap water instead of bottled mineral or natural well water also seems to be associated with higher prevalence of BS. There is conflicting data on the influence of oral hygiene [10].

The results on the influence of the socio-economic state on the formation of pigmentations are dissonant. Some authors show that a low level of education is associated with a higher prevalence of BS, while others report contrary results [11].

Chen *et al.*, have shown that the occurrence of BS increases with age, but the correlation is not statistically significant. In one study, a greater number of coloured tooth elements were observed in permanent dentitions than in deciduous dentitions.

It was noted that children who had never been fed bottles tended to have a greater presence of BS.

In 1890, Miller noticed the presence of BS in his family members and suggested a correlation with a hereditary constitutional factor.

Ronay *et al.*, argued for the possibility of an individual predisposition for BS, because not all family members with the same eating habits showed the presence of BS, thus diminishing the importance of the environmental component.

The results of these studies gave reason for a positive family connection, in fact the family members included in the study had a specific high severity of 47.8% [12].

Some products containing *Lactobacillus* are indicated for Black stain although there is no data in the literature and there is no a protocol for the use of *Lactobacillus reuteri* in pigment eradication including black stain.

As a result, effective therapy in the treatment of tooth pigmentations is still a challenge for dental hygienists and dentists, as pigmentation tends to reform even after professional hygiene. In fact, professional hygiene temporarily solves aesthetic problems, but does not cure the causes of the formation of these pigments [13, 14].

CONCLUSION

BS is a type of extrinsic tooth discoloration usually forming a line near the gingival margin.

BS is a specific type of extrinsic dyschromia caused by the presence of chromogenic bacteria in the oral cavity, which occurs more frequently in children, but may also occur in adults. In young subjects, these forms sometimes tend to regress with puberty and the transition to adulthood.

Although the presence of these pigmentations represents an aesthetic problem for the patient, some studies have shown that in these subjects there is a lower experience and prevalence of caries that can be explained by the beneficial salivary parameters (higher concentrations of calcium and higher buffer capacity) and by the presence of non-cariogenic plaque.

There is a certain familiarity at the basis of these dyschromia, but it seems that there may also be a direct exchange of chromogenic bacteria (effusions) or indirect, through tools (toothbrushes, cutlery).

The correct diagnosis of the causes of pigmentation is fundamental as it affects the choice of the most appropriate treatment.

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