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Original Research Article

Relationship between Black Chromogenic Stains and Hemoglobin Levels

Dr. Sruthy Prathap[1*], Dr. Prathap M.S[2], Dr. Nihala Sali[3]

[1]Additional Professor, Department of Periodontology, Yenepoya Dental College, Karnataka, India
[2]Professor and Head, Department of Conservative Dentistry and Endodontics, Yenepoya Dental College, Karnataka, India
[3]General Dentist, Cochin, Karnataka, India

***Corresponding Author:** Dr. Sruthy Prathap
Additional Professor, Department of Periodontology, Yenepoya Dental College, Karnataka, India

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Abstract: ***Background:*** Occurance of black discolouration of teeth is very common and a clinical challenge in the present day dentistry. Stains associated with chromogenic bacteria have a high rate of recurrence even after thorough scaling and polishing procedures. The mechanism of stain formation is still not understood clearly though its chemical composition is mainly iron suiphide and bacteria like actinomyces have been identified in plaque samples of these patients which have the ability to form iron sulphides. The iron content of saliva is known to increase in iron deficiency anemia and iron overload. Iron deficiency anemia is also associated with low hemglobin levels. ***Aim:*** To determine the hemoglobins levels in patients with and without black chromogenic stains. ***Methodology:*** A total of 40 patients of age group 15-40 years were selected and divided in to two groups. Group 'A' (Test group) consisted of 20 patients with black stains on atleast 8 tooth. Group "B" (Control group) consisted of 20 patients without any stains on the tooth surfaces. The individuals were screened for Lobenes stain index, Oral hygiene index and haemoglobin levels. The scores were analysed using chi –square tests. ***Results:*** It was observed that there was no significant difference between the haemoglobin levels of patients with and without stains. The oral hygiene scores were found to be significantly higher in subjects with stains compared to controls. ***Conclusion:*** The study suggests that the presence of stains were not associated with the reduced haemoglobin levels. The chromogenic black stains were more prevalent among subjects with good oral hygiene.

Keywords: dentistry, Occurance, iron deficiency anemia, hemoglobins levels.

INTRODUCTION

Black discoloration of the teeth is a frequent dental finding currently associated with clinical and esthetic concern to millions of adults and children. These stains differ 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 [1].

Investigations on black stains have now continued over a century. Different terms for condition include mesenteric line, brown stain, black extrinsic tooth stain, black line stain or pigmented dental plaque. Black stains occur in any age and its therefore found both on primary as well as permanent dentition but there seems to be a peak in childhood and decrease in prevalence in adolescence and adulthood [2].

In many cases a spontaneous reduction has been noticed from the second decade of life. In individuals who present with this condition, a specific oral micro flora has been associated. According to Herald etal tooth pigmentation is formed by precipitation of chromogenic bacteria from dental plaque and deposition of colored substances from the substrate present in the oral cavity or formation of colored substances due to chemical decomposition of pellicle components [3].

Colour producing chromogenic bacteria has been associated with this discolouration which contains a high content of calcium and phosphate and an insoluble ferric salt which has been made accountable for the colour. Nevertheless the etiology has not been clarified completely till date and it has been found that these stains are not associated with any disease like dental caries or periodontal pathologies. 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 [2]. Presently such stains have been found to be equally prevalent among adults also.

These stains are primarily known to be caused by accumulation of iron in tissues and secretions which together with chromogenic bacteria are the primary cause of this pathology. Among the metabolic products synthesised by bacteria in the oral cavity, hydrogen sulfide is of considerable interest as they react with iron available in saliva, in pathological conditions (iron metabolism disorders), it forms black precipitates consisting of ferric sulphide. These precipitates bind to the surface of the teeth, tending to form a stria that usually follows the contour of the gingiva, with an unsightly and variable chromatic intensity [4].

Research on etiological factors of black stain had been done before and found that the quantity of actinomyces on plaque of children's tooth with black stain was significantly higher than those without black stain [5].

It is well known that Actinomyces strains produce hydrogen sulphide, which can result in ferric sulphide formation in the presence of iron in saliva or gingival exudates. Formation of iron sulphide is facilitated by increased iron content in saliva. In iron deficiency anemia and iron overload, the concentration of iron present in saliva is much higher than in individuals with no anemia. The salivary ferritin levels in saliva were found to be elevated in iron deficient individuals as compared to controls [6].

Low haemoglobin levels usually indicate that the patient has anemia. There are several kinds of anemia of which iron deficiency anemia is the most common type. This form of anemia occurs when a person does not have enough iron in the body and cannot make the haemoglobin it needs.

The main aim of this study is to assess the haemoglobin levels of patients with and without chromogenic stains and to determine if there is an asscociation between occurance of stains and reduced haemoglobin levels

MATERIALS AND METHODS

The patients who participated in the study were selected randomly from the outpatient reporting to the Department of Periodontics, Yenepoya Dental Colloege, Mangalore, India. Informed consent was taken from all the patients who participated in the study. Prior clearance was obtained from institutional ethical committee.

A total of 40 patients of age group 15-40 years were selected from outpatient of department of Periodontics, Yenepoya Dental College and divided in to two groups.

Group 'A' Test group consists of 20 patients with black stains on atleast 8 tooth.

Group "B" consist of 20 patients without any stains on the tooth surfaces.

A detailed history was recorded which included the following. Diet history, family history, past dental history, personal history, drug history. The patients were divided in to two groups.

Inclusion Criteria

- Patients of age 15-40 years.
- Patients with black chromogenic stains with Lobene stains index score more than 1 in group A.
- Patients without any form stains on the tooth surfaces were included under group B.

Exclusion Criteria

- Patients having deleterious habits like smoking, betel leaf chewing.
- Patients who use mouth rinses.
- Patients who have orange, green or brown stains on the tooth surfaces.
- Patients who take iron supplements or other medication (Ayurvedic).
- Regular users of tea or coffee.

Study Design

The sample size was determined according to the power of the study (80%) as per the recommendations of the statistician. The following clinical parameters were recorded in both the groups.

- Lobenes Stain Index [7].
- Hemoglobin levels.
- Oral hygiene index [8].

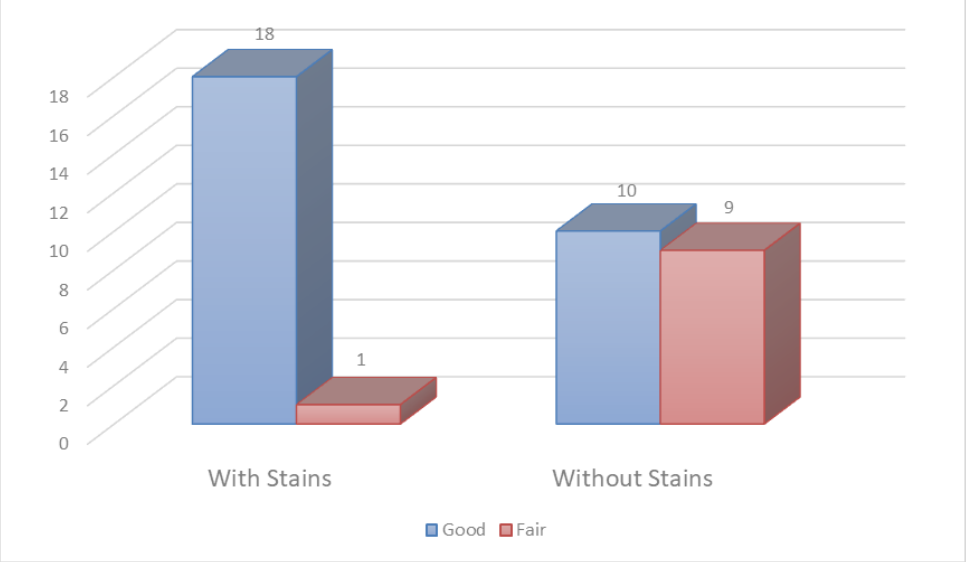
The data collection was carried out by a single examiner.

RESULTS

Table 1: Comparison of mean hemoglobin levels among patients with and without extrinsic stains

	Group	N	Mean ± SD	df	t	P value
Hemoglobin Level	with Stains	19	12.5 ± 0.72	36	0.488	P = 0.629
	without Stains	19	12.26 ± 1.98			NS

Level of significance at P < 0.05
NS – Not significant using unpaired't' test
SD – Standard Deviation



Graph 1

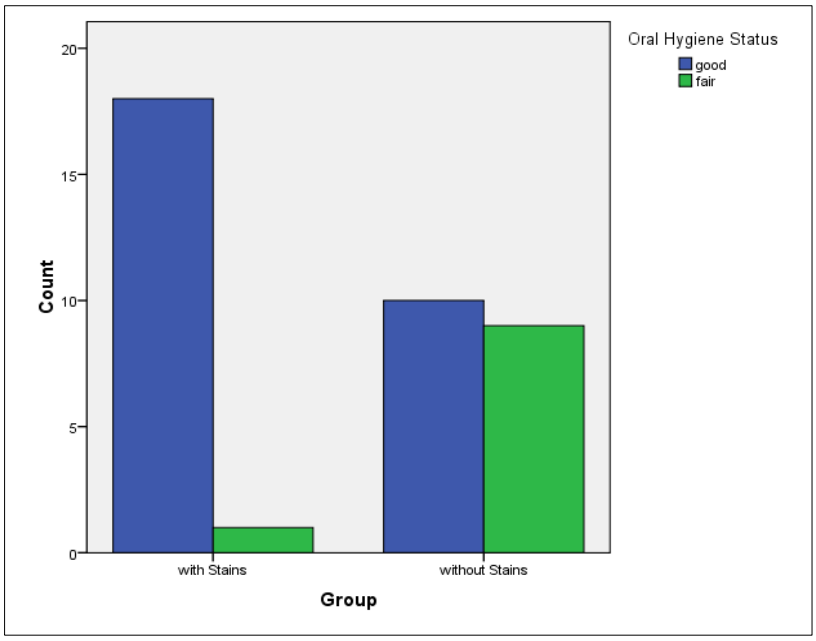
It is observed from table 1, that hemoglobin levels were marginally higher among study subjects with stains when compared to those without stains. However, the mean difference was not statistically significant (P = 0.629).

Table 2: Oral Hygiene Status of study participants with and without stains

Group	OHI - Status			Chi value	P value
	Good	fair	Total		
with Stains	18	1	19	8.686	P = 0.003*
without Stains	10	9	19		
Total	28	10	38		

Level of Significance at P < 0.05
*Statistically significant using Chi Square test

Table 2 There was a statistically significant difference (P = 0.003) in oral hygiene scores between the groups. The group with stains had higher proportion of study subjects with good oral hygiene status when compared to group without stains.



DISCUSSION

Tooth discolouration can be a consequence of different local factors. Literature shows that black pigmentation contains undissolved iron, probably iron sulphide, which is formed by interaction of hydrogen sulphide produced by bacteria from periodontal tissue and iron from saliva or gingival exudates.

Saba *et al.*, used polymerase chain reaction to reveal a signifi cantly higher prevalence of Actinomyces and Aggregatibacter actinomycetemcomitans in black stain compared to the plaque of the control group [9].

In a survey of black stain in Spain, a statistically significant relationship was found between black stain and regular consumption of food rich in iron [10].

According to Reid *et al.*, brown and black pigmentation contains undissolved iron, probably iron-sulfide, which is formed by interaction of hydrogen-sulfide produced by bacteria from periodontal tissue and iron from saliva or gingival exudates [11].

Ilir Mesonjesi *et al.*, in 2012 conducted a study on black stains and concluded that these stains were composed of ferric compounds. He also concluded that these stains may be iron- saturated bovine lactoferrin and a sign of iron deficiency anemia or iron overload if no iron supplements are taken or individuals have no frequent gingival bleeding [12].

Aggarwal and co-workers observed that saliva contains ferritin and changes in ferritin levels have been observed in irondeficiency and its levels in saliva were much higher than the normal. The exact mechanism by which anemia caused a rise in salivary ferritin level is not exactly known. Nithya *et al.*, (2012) observed a threefold rise in the salivary ferritin levels in iron deficient patient compared to normal individuals [13, 14].

The studies focusing on black stains are scarce in recent scientific literature. Most studies were conducted during 1960s and 1970s. The present study was aimed at determining the relation between presence of black stains and haemoglobin levels of the subjects. The findings of the study suggests that there was no significance difference in the haemoglobin levels in subjects with and without stains though the subjects with black stains had marginally higher haemoglobin levels as compared to those without black chromogenic stains. The subjects with and without black stains were systemically healthy and did not suffer from iron deficiency anemia. Hence the present study have differed from the findings of the study done by Ilir Mesonjesi *et al.*, which suggested that these stains may be iron- saturated bovine lactoferrin and a sign of iron deficiency anemia or iron overload if no iron supplements are taken or individuals have no frequent gingival bleeding [12].

Anemia has been found to be a risk factor for various oral diseases and also has been associated with gingival and periodontal diseases [15, 16].

The present study also suggests that the group with stains had higher proportion of study subjects with good oral hygiene status when compared to group without stains. The findings are similar to the earlier study conducted by Prathap S *et al.,* [17].

Eriksen and Norbodo also confirmed that black staining was found in patients with good oral hygiene and can be retentive particularly around cervical margins of the teeth [18].

Dayan *et al.,* also reported that presence of black stains were associated with lower plaque scores and poor oral hygiene may result in green, brown- black and orange staining [19].

CONCLUSION

Black tooth stains associated with chromogenic bacteria is a common clinical entity. The mechanisms and constitution of these stains have not been understood perfectly though it has been reported to be composed of ferric compounds and increased iron levels in saliva which usually occurs in iron deficiency anemia and iron overload. Iron deficiency anemia is characterised by reduced hemoglobin levels. The present study shows that there was no significant difference in the hemoglobin levels of subjects with or without stains and the levels of hemoglobin was marginally higher in subjects with stains. Hence it can be summarized that the presence of these stains may not be a sign of iron deficiency anemia. However further studies with more number of subjects might be required to substantiate the findings and assess the other possible mechanisms of staining.

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