



## Case Report

## Power of Amplified Light Against Chromogenic Bacterial Stains - A Case Report

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## ARTICLE INFO

## Article history:

Received 11.10.2022

Accepted 02.12.2022

Published 28.12.2023

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[https://doi.org/](https://doi.org/10.38138/JMDR/v9i2.22.46)

10.38138/JMDR/v9i2.22.46

## ABSTRACT

The treatment of black stains has always been a grey area for the dentists to deal with due to its recurrence. The more effective treatments in current literature are lactoferrin, diode laser, laser Nd:YAG and phototherapy. An attempt was made to remove the stain using low level laser therapy with the similar principle of lethal laser photosensitization and photodynamic therapy without the use of any dye. Our study showed a positive result with the reduction of black stains over a period of 1 year. Hence, the use of LLLT could be considered as one of the adjunct treatment modality for chromogenic bacterial stains.

**Keywords:** Black stains; Biostimulation; Chromogenic bacterial stains; Diode laser; Low level laser therapy

## 1 INTRODUCTION

A frequent dental finding associated with clinical and aesthetic problems is tooth discoloration. It differs in its etiology, appearance, composition, location and severity<sup>(1)</sup>. Dental practitioners should have an understanding of the etiology of tooth colour discoloration in order to make a proper diagnosis and treatment plan<sup>(2)</sup>. Tooth discoloration can be broadly classified based on their location under intrinsic tooth discoloration, extrinsic tooth discoloration and internalised discoloration<sup>(3)</sup>. Extrinsic discoloration includes metallic (iron, copper, potassium permanganate, silver nitrate, stannous fluoride) and non-metallic (dietary components, beverages, tobacco, mouthrinses, other medicaments and chromogenic bacteria) origin and could be of different colours like green, black, brown or shades<sup>(4)</sup>.

One of the etiological factors in the production of black pigment was proposed to be chromogenic bacteria<sup>(5)</sup>. The

extrinsic stain which appears black is mainly caused by *Actinomyces* species. They have a very high recurrence rate and it may reappear even one month after their complete removal using scaling and polishing<sup>(6)</sup>. The most effective therapies given in literature are lactoferrin<sup>(7)</sup>, diode laser<sup>(8)</sup>, laser Nd:YAG and phototherapy<sup>(9)</sup>.

This article is a case report at an attempt to remove the chromogenic bacterial stains using a diode laser in low level laser therapy mode as an adjunct to scaling.

## 2 CASE REPORT

A 24-year-old female patient reported to the Department of Periodontics and Implantology, Coorg Institute of Dental Sciences, with a complaint of black stains on her teeth. She gave a history of recurrence of the black stains even after professional scaling which was performed 6 month back. After obtaining consent from the patient, we decided to perform a low level laser therapy session using a 980nm

diode laser in biostimulation mode (0.5W, Continuous wave for 1 minute) prior to scaling. A round of scaling and polishing was then carried out after the LLLT.

Review of the patient was done at 6 months and 12 months. A reduction in the black stains was seen at both 6th and 12th month review. The patient also appeared to be satisfied with the result obtained. The patient also further wished to continue the LLLT therapy on the subsequent visits.



Fig. 1: Pre- Scaling



Fig. 2: Low level laser therapy performed



Fig. 3: LASER settings



Fig. 4: Post scaling



Fig. 5: After 6 months

### 3 DISCUSSION

A common dilemma encountered in the clinic is the treatment of chromogenic bacterial stains which tends to recur even after a professional cleaning. The stains consists of ferric sulphides which is produced by the hydrogen sulfide of anaerobic bacteria and the iron excess in the saliva<sup>(10)</sup>. Certain periodontal pathogens are also known to be black pigmented anaerobes of the oral cavity. They are *Porphyromonas gingivalis*, *Prevotella intermedia*, and



Fig. 6: After 1 year

*Prevotella nigrescens*<sup>(5)</sup>.

A study conducted by Li et al., evaluated oral microbiota in children with and without black stain. An abundance of *Actinomyces*, *Cardiobacterium*, *Haemophilus*, *Corynebacterium*, *Tannerella* and *Treponema* were seen in the plaque samples of children with black stain. It was also seen that patients with pigmentation have less *S. mutans* and lower saliva pH than patients without pigmentation<sup>(11)</sup>.

Various methods such as whitening toothpastes, professional cleaning, polishing and micro-abrasion with abrasives and acids have been advocated for the removal of these black stains. According to scientific literature, the more effective treatments are the use of lactoferrin, diode laser, laser Nd:YAG and phototherapy<sup>(12)</sup>.

This case was an attempt to remove the stain using low level laser therapy with the similar principle of lethal laser photosensitization and photodynamic therapy without the use of any dye. The protohaem and protoporphyrin are the compounds targeted in the black pigmented bacteria that can absorb the red light and can cause the killing effect of the laser<sup>(13)</sup>. This was the proposed mechanism for the removal of the stains and prevent its recurrence.

Our case showed a positive result with the reduction of black stains over a period of 1 year and hence it could be considered as one of the adjunctive treatment modalities for the chromogenic bacterial stains along with scaling. To our knowledge, the present case report is the first description in the literature of the use of low-level laser therapy to successfully treat chromogenic bacterial stains.

#### 4 CONCLUSION

Nowadays, aesthetics is one of the major concerns of patients visiting a dental clinic. Non-invasive procedures in aesthetic

dentistry are on the rise due to patient compliance and awareness. Low level laser therapy is an easy, non-technique sensitive treatment modality that can be tried for the reduction in recurrence of chromogenic bacterial stains. Further short term and long-term researches using larger sample size should be conducted to test the efficacy of this treatment modality.

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