



## Creating Illusion in Mild Anterior Teeth Proclination : An in-Vivo Study.

### KEYWORDS

Esthetics, Illusion, Tooth bleaching.

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**ABSTRACT** *Introduction : The study was undertaken to investigate the effect of change in colour (value alteration) on optical illusion in cases of mild anterior proclination.*

*Methods : The study was conducted on 20 subjects with mild maxillary or mandibular anterior teeth proclination. Cephalometric values fell within the normal range and ruled out the need for orthodontic correction. It was planned to bleach the anteriors of respective arch to create a shade illusion and thereby camouflage the proclination. Color measurements were executed by using a shade guide (VITA 3D-Master Shade Guide). Pre-operative photographs were taken and smile was assessed Office bleaching (Pola office) was done for either upper or lower arch and post operative smile assessment was done to evaluate the effectiveness in producing the illusion .*

*Results :Statistically significant difference was observed where bleaching camouflage the proclination by 57% using Z test in cases of mild anterior teeth proclination.*

### Introduction

An attractive, well-balanced smile can be a valuable personal asset. Esthetic procedures are becoming an increasingly important component of contemporary dental practice. An esthetic smile is the result of the interaction of different smile components and requires an understanding of the principles that manage the balance between teeth and soft tissues.

Our goal is to minimize the loss of healthy tooth structure and tissue while providing treatment that are predictable and result in long term functioning esthetics and patient satisfaction. Lombardi in 1973 while considering denture esthetics stated, "By increasing the value of the colour (lightening the shade) it is possible to make the object appear closer."<sup>1</sup> Considering the similar principle, the present study aimed to evaluate value alteration on optical illusion in cases of mild anterior proclination.

### Methods

#### Subject selection

20 subjects with mild anterior proclination came to K.V.G Dental college were selected for the study. The consent was obtained from the ethical committee of KVG Dental college and Hospital. Those with maxillary anterior restorations, trauma, or any maxillofacial surgery , unpleasant dental alignment (crowding, spacing, rotation, or severe dental tilt), remarkable malformations, discoloration, or structural deformities of the teeth, unpleasant fractured teeth, severe dentofacial deformities, unpleasant gingival color or contour, obvious asymmetries, periodontal treatment, tooth sensitivity and pregnant women were excluded from the study.

Cephalometric measurements as described by Steiner were utilised in this investigation to classify the dentition as "Mild proclination". Subjects with Upper incisor to Nasion-Point A(degree): 22-24, Upper incisor to NA(mm): 4-6, lower incisor to Nasion-PointB(degree): 25-27 and lower incisor to NB (mm):4-6 were selected for the study.

#### Image capture

Two photographs were taken from each volunteer with the camera Canon D1100 (Canon Incorporation Tokyo, Japan); before and after bleaching. The volunteers were seated in an up right position on an office chair and the head was positioned without support and the individuals were asked to look straight ahead. The focal distance of all the photos was standardized by fixing the focus in the beginning of the procedure, in such way that there was a fixed distance between the camera and the volunteer's smile.

#### Bleaching

An in-office bleaching regimen was executed. First the tooth color shade was verified using a color shade guide (Vitapan 3D Master) by visual examination, and the color shade was chosen as the best match with the patient's natural teeth. Next, OpalDam (IvoclarVivadent, Amherst, NY, USA) was used to ensure relative isolation and was applied at the contour of the gingival tissue in an attempt to avoid the contact between the bleaching gel and the gingiva. Then, the Pola Office bleaching material which is a hydrogen peroxide-based gel, was applied using a syringe, covering the buccal surface of the lower anterior teeth. After 8 minutes of application, the gel was removed from the tooth surface. Asatisfactory whitening of the teeth was observed and final shade was assessed with the shade guide.

### Smile assessment

10 dentists of KVG Dental College were selected to evaluate the photographs. The smile photograph of the 20 patients before and after bleaching were projected as slide 1 and slide 2 for each case using Microsoft power point. The evaluators were blinded regarding the pre and post bleaching photographs and were asked to answer question on their assessment of the proclination of teeth. Each case were assessed based on three alternatives: (a) less proclination in slide 1 (b) less proclination in slide 2 (c) no difference in proclination in slide 1 and slide 2 and results were tabulated for each patient.

### Results

Data obtained were entered into Microsoft Excel sheet and analyzed statistically using Stat Cace software. Of the 200 responses, 12 responses found no differences, 81 responded less proclination before bleaching and 107 found less proclination after bleaching ( Figure 1). Z test was used to find if there exists any association between bleaching and its ability to produce illusion in cases of mild anterior proclination. The data collected from the 20 subjects revealed the existence of a statistically significant association ( $p=0.004$ ) between bleaching and its ability to reduce the appearance of proclination by illusion. Calculation of Odd's ratio found that there is a chance of reduction of appearance of proclination by 1.74 times after bleaching (Table 1).

### Discussion

Dale Carnegie said that one of the most important ways to win friends and influence people is to smile.<sup>2</sup> Much effort in restorative dentistry has been spend on improving appearance of the teeth in order to improve the smile. Major obstacle to obtain a beautiful smile comes mainly in the form of crowding and anterior teeth proclinations. However it can be corrected by orthodontic and esthetic restorative treatment. But orthodontic treatment takes long duration and esthetic restorative treatment requires shorter time but considerable amount of enamel and dentin has to be sacrificed.<sup>3</sup> Our goal is to minimize the loss of healthy tooth structure and tissue while providing treatment that is predictable and patient satisfying.

Creating an illusion is one of the most important objectives of esthetic dentistry. Clinicians such as Blancheri, Frush, Lombardi, Goldstein, Pound and Pincus have utilized different concepts of contouring, arrangement and staining to create illusion and have been instrumental in developing esthetic dentistry illusion<sup>4</sup>

Most important is patient selection criteria. Patients with mild anterior proclination as determined using cephalograms and photographs were the study subjects. It is well established that facial balance making use of cephalograms and photographs can be used to determine relationships and proportions.<sup>1</sup>

Reflection from smooth mirror-like surface results in the production of a clear well defined image. This is called specular reflection. A specular reflection returns a high percentage of direct non-diffused light, and if strongly illuminated, will be brighter and stand out. The more reflective the surface, the more wavelengths return to your eyes and the additive combination of more wavelengths yields whiter light (hue change). Brighter objects appear closer to the viewer. Hence in our study we used bleaching as a treatment option to increase the value, thereby changing the colour to create an illusion of appearing nearer to

the observer. This was a preliminary attempt to explore the possibility of using bleaching as a treatment option to create illusion in mild anterior proclination thus providing immediate esthetics.

Bleaching is safe, low cost, conservative treatment to obtain vital tooth whitening without using restorative materials.<sup>7,9</sup> Among the bleaching techniques for vital teeth, in office bleaching using  $H_2O_2$  has shown to be advantageous. Teeth whitening mechanism is not totally understood however it is believed that the bleaching agent ( $H_2O_2$ ) is decomposed to produce oxygen ( $O^+$ ) and hydroxyl radicals ( $HO_2$ ). These free radicals attack tooth dark pigment molecules (organic macro molecules formed by aromatic rings) to obtain stability by breaking them into smaller, lesser complex and clearer molecules than original ones.<sup>10</sup>

Tooth sensitivity has been reported as the main side effect of tooth bleaching. The sensitivity due to tooth bleaching in clinical observations suggests that it is transient, with no long-term effects. However, literature has demonstrated that 15% - 65%<sup>11,12</sup> of patients show tooth sensitivity increasing during bleaching treatment which is due to  $H_2O_2$  propagating through enamel and dentin reaching the pulp. In our study tooth sensitivity was not reported by any patient. The reason could be due to single application of bleaching agent and fluoride therapy after bleaching.

In our study the opposing arch to that of proclined teeth was bleached. Bleaching of the opposing arch makes the tooth lighter; tooth that is too light appears to "jump out at you so that it produces illusion of nearness"<sup>13,14</sup>

Several problems are inherent to an investigation of this type. The biggest problem is that the evaluations are subjective. Participants were instructed to base their ratings on their feelings however the consistent average in each category evaluated suggests the findings are reliable.

Results of the study showed bleaching camouflage the proclination by 57% where as before bleaching it was found to be 43%. This shows the beneficial effect of bleaching as a temporary treatment option for mild anterior proclination case where patient is not willing for other esthetic corrections.

### Conclusion

A scientific approach to decision making should reconcile evidence based information in diagnosis, prognosis, and therapy. There are still many gaps in the knowledge of important aspects in this process with respect to the rapidly increasing interest in esthetic and cosmetic dentistry, better knowledge of perception of various details of dental appearance is desirable. Bleaching the opposing teeth in mild anterior proclination using illusion concept can be a successful approach and provides answers to many questions in this field

Table I : Observers response towards the photographs

	Before bleaching	After bleaching	Valid responses	Significance by Z test
Reduced Appearance of proclination	81(43%)	107(57%)	188	Z=2.68, p=0.004, SS

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