

## Evaluation of Maxillary Central Incisor Tooth Shade and its Correlation with Eye Colour and Hair Colour in an Indian Population

Research Article

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### Abstract

**Aim:** Selecting the tooth shade considering the eye colour and hair colour can bring in more life to the prosthesis. The aim of this study was to evaluate the maxillary central incisor tooth shade and its correlation with eye colour and hair colour in an Indian population

**Materials And Methods:** The study comprised of 100 individuals in the age group of 18-70 years. Among them 36 were males and 64 were females. The tooth shade of the patient was evaluated among Indian population using Vitapan classic shade guide (Vita Zahnfabrik H Rauter, Germany). Age, gender of the patient was noted. Eye colour and hair colour of the patient were recorded in categories. The recordings were tabulated, and the data was analysed by descriptive statistics using SPSS software.

**Results:** In the study population, majority of the patients had dark brown eye colour (54%) followed by light brown (27%), black (12%), and grey (7%). A2 was the most common tooth shade. There was no significance correlation between eye colour with the tooth shade. Population with black, dark brown and light brown hair colour had predominantly A2 shade (31.0%, 31.8%, 46.2% respectively) and people with grey hair had predominantly A3 shade (42.9%).

**Conclusion:** Within the limitations of the study, among the Indian population, A2 was the most common tooth shade in both the young men and women. Darker hair colour patients had dark tooth shade. No conformity between the shade of teeth and eye color was found in this study.

**Keywords:** Tooth Shade; Indian Population; Central Incisor; Eye Colour; Hair Colour.

## Introduction

Esthetics is an important perspective affecting the success of dental restorations [1]. In this regard, selecting a suitable tooth shade is a vital step ensuring natural appearance with dental restorations [2]. Shade selection with the help of shade guides and color matching the restorations to the natural dentition continues to be one of the most perplexing and frustrating problems. A correct color match to the natural tooth is just one of the essentials in creating an aesthetic restoration [3, 4]. Visual response of an individual, quality and quantity of the viewing lights, metamerism, color of the surroundings and past experiences are among those elements that enter into the color matching [5-7]. Shade selection requires knowledge of physics, physiology and psychology of color and therefore it is both an art and science requiring in

depth knowledge, accurate clinical judgment and perception on the part of the dentist [5]. Advances in technology have made shade selection easier, because of the availability of a wide range of commercially available shade guides. Early shade guides were derived from tooth colors that were considered pleasing, rather than from the distribution of shades found in the general population. In 1931, Clark recognising the need for a more systematic approach, introduced a custom shade guide based on visual assessment of human teeth, recorded in Munsell: Hue, Value, and Chroma [8-11].

In dentistry, comparison with remaining teeth is frequently used to select the color of artificial teeth [12]. This method cannot be used when providing an edentulous patient with a new set of complete dentures. There is no shade selection system for edentulous

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patients. Shade selection for artificial teeth becomes a subjective process [13]. Dentists either choose shade for denture teeth with their clinical experience, shade guides or patients choose shade from the tabs of teeth in a shade guide. In these situations, skin, eye, gender or age are taken as guides that could help dentist while choosing shade for denture teeth in edentulous patients [14].

Our team has numerous highly cited publications on well-designed clinical trials and lab studies on various topics in endodontics in the past couple of years [15-30]. This provided us with the right platform to pursue the current study. There is no literature evidence investigating the relationships between tooth color and eye color or hair colour in Indian population. The purpose of this study was to evaluate the tooth shade of maxillary central incisor and its correlation with hair color, eye color in Indian population.

## Materials and Methods

A cross-sectional, analytical study with a non-probability convenient sampling technique, conducted. 100 patients, who visited for a routine dental check-up were chosen for the evaluation. Patient were informed about the evaluation and consent received.

The cross sectional study consisted of a sample size of 100 individuals belonging to both genders. Individuals in the age range of 18 years to 80 years with at least one completely erupted permanent maxillary right central incisor were considered for this study. Permanent maxillary central incisors with carious lesions, restorations, endodontically treated teeth, intrinsic staining, extrinsic staining due to diet, smoking and tobacco/pan chewing, tooth wear or any tooth abnormality, xerostomia and history of tooth bleaching or radiation therapy were excluded from the study. The shade of middle third of the labial surface of permanent maxillary right central incisor was recorded using the Vitapan classic shade guide (Vita Zahnfabrik H Rauter, Germany) and to avoid error the recording was done after placing cheek retractor and drying the teeth with cotton. The shade was assessed by the visual observation using natural light.

Following tooth shade the eye colour and hair colour of the individual was assessed. Eye color was assessed as 1=black; 2=dark brown; 3=light brown; or 4=Grey, grey/blue. The eye colour was assessed in the day light. Any patient with lens was excluded and

assessed. The patient original hair color was assessed as 1=black, 2=dark brown, 3=light brown, and 4= Grey/ red. Any hair extensions or patient with hair colouring done were excluded.

The data obtained were entered into the computer and descriptive statistical analysis was done using an statistical package of social sciences (SPSS) software. A p-value of  $\leq 0.05$  was considered significant.

## Result and Discussions

Among the study population, majority of the patients had dark brown eye colour (54%) followed by light brown (27%), black (12%), and grey (7%). Among these patients A2 was the most common tooth shade. The results shows that, people with black eye had most commonly A2, A3, A1 shades followed by A3.5, A4, B3. People with dark brown eye had most commonly A2, A3, B2, A3.5 shades followed by B1, A1, C1, C2, B3, B4. People with grey eye had commonly A2 followed by A3, A3.5, B2, B3 shades. Light brown eye individuals had more of A2, A1, B2, A3.5 followed by B1, C1, A3, C2 tooth shades. But statistically it showed no significance between the eye colour and tooth shade (Table 1).

Among the study population, majority of the patients had black hair colour (58%), followed by dark brown (22%), light brown (13%), and grey (7%). According to our results, black hair individuals mostly had A2, A3, A1, B2 tooth shade followed by other shades. Individuals with dark brown hair commonly had A2, A3.5 tooth shade followed by B1, B2, C1, C2, A3. Individuals with grey hair were less and had A3, A3.5 shades. People with light brown hair had A2, B2 tooth shade followed by A1, B1, B3, C1 tooth shades. Results showed statistical significance ( $p = 0.015$ ) and thus the tooth shades had correlation with the hair colour of an individual (Table 2).

Color is one of the most important determinants of dental esthetics. The trend toward a heightened awareness of esthetics has challenged dentistry to look at dental esthetics in a more organized and systematic manner, so that the health of patients and their teeth is still the most important underlying objective. But some existing dentitions simply cannot be restored to a more pleasing appearance without the assistance of several different dental disciplines. Today, every dental practitioner must have a thorough understanding of the roles of these various disciplines

**Table 1. Cross tabulation of eye colour and tooth shade of central incisor among Indian population.**

EYE COLOUR	TOOTH SHADE (No. of teeth and %)										Total	
	A1	A2	A3	A3.5	A4	B1	B2	B3	B4	C1		
BLACK	2 16.70%	4 33.30%	3 25.00%	1 8.30%	1 8.30%	0 0.00%	0 0.00%	1 8.30%	0 0.00%	0 0.00%	0 0.00%	12 100.00%
DARK BROWN	4 7.40%	14 25.90%	9 16.70%	6 11.10%	0 0.00%	5 9.30%	8 14.80%	1 1.90%	1 1.90%	3 5.60%	3 5.60%	54 100.00%
GREY	0 0.00%	3 42.90%	1 14.30%	1 14.30%	0 0.00%	0 0.00%	1 14.30%	1 14.30%	0 0.00%	0 0.00%	0 0.00%	7 100.00%
LIGHT BROWN	4 14.80%	10 37.00%	1 3.70%	3 11.10%	0 0.00%	2 7.40%	4 14.80%	0 0.00%	0 0.00%	2 7.40%	1 3.70%	27 100.00%
Total	10 10.00%	31 31.00%	14 14.00%	11 11.00%	1 1.00%	7 7.00%	13 13.00%	3 3.00%	1 1.00%	5 5.00%	4 4.00%	100 100.00%

Table 2. Cross tabulation of hair colour and tooth shade of central incisor among Indian population.

HAIR COLOUR	TOOTH SHADE (No. of teeth and %)										Total	
	A1	A2	A3	A3.5	A4	B1	B2	B3	B4	C1		
BLACK	9 15.50%	18 31.00%	10 17.20%	3 5.20%	0 0.00%	3 5.20%	7 12.10%	2 3.40%	1 1.70%	3 5.20%	2 3.40%	58 100.00%
DARK BROWN	0 0.00%	7 31.80%	1 4.50%	6 27.30%	0 0.00%	3 13.60%	3 13.60%	0 0.00%	0 0.00%	1 4.50%	1 4.50%	22 100.00%
GREY	0 0.00%	0 0.00%	3 42.90%	2 28.60%	1 14.30%	0 0.00%	0 0.00%	0 0.00%	0 0.00%	0 0.00%	1 14.30%	7 100.00%
LIGHT BROWN	1 7.70%	6 46.20%	0 0.00%	0 0.00%	0 0.00%	1 7.70%	3 23.10%	1 7.70%	0 0.00%	1 7.70%	0 0.00%	13 100.00%
TOTAL	10 10.00%	31 31.00%	14 14.00%	11 11.00%	1 1.00%	7 7.00%	13 13.00%	3 3.00%	1 1.00%	5 5.00%	4 4.00%	100 100.00%

in producing an esthetic makeover, with the most conservative and biologically sound interdisciplinary treatment plan possible.

Ceramics are replacing metals as materials of choice in dental crowns, as well as in other biomechanical prostheses. Tooth color is determined by a combination of extrinsic and intrinsic factors [31, 32]. Extrinsic factors are related to the deposition of either food or beverage stains over the enamel and the acquired pellicle [33, 34]. Intrinsic factors are related to the enamel and dentin properties of reflection and light dispersion. The choice of the correct tooth shade for the fabrication of a restoration poses a challenge, even for experienced clinicians [35]. Various factors, such as type and intensity of the light source, time of day and year, angle of incidence, and patient's clothes and color of the operatory furnishings will influence and complicate the shade-taking procedure [36, 37].

This study tried to establish a relationship between shade values of teeth with eye colour and hair colour of individuals. In this present study, a traditional method of shade matching using a conventional shade guide under daylight was carried out among 100 individuals. In previous studies, shade matching was done using the other dental shade matching systems such as spectrophotometer and spectroscope [38]. As these methods seem to be more expensive and also some host difficulty, it is necessary for the dentist to depend on the method of shade matching systems which is simple, practical and gives reliable results as well. Vitapan classical shade guide (Vita Zahnfabrik H Rauter, Germany) was used for shade matching in this study as it is one of the widely used methods among various dentists [38].

For tooth shade determination, the middle site of the tooth was used. The middle site of the teeth is said to be best representative of its colour because the incisal edge is most often translucent and is affected by its background while the cervical third is modified by scattered light from the gingiva [39].

A total of 100 individuals were evaluated for the study. Among the 100 patients, 36 were males and 64 were females. According to the results, the most common tooth shades were found to be A2 and A3 shades and the least common were found to be A4 and B4 shades. In previous articles, Hasegawa observed that the natural tooth color showed a significant decrease in lightness at the

center to cervical site and increase in yellowness with advancing age [40, 41]. Similar correlation was reported by Jahangiri where a significant association was found between tooth color and age of the patients, in that with advancing age, teeth tended to become darker in color [42]. In other studies by Esan, he indicated that gender is significantly associated with tooth shades, in that men are more likely to present with darker tooth shades whereas women of the same age group were more likely to show lighter tooth shades [43]. The present study focused on the correlation between the eye colour and hair colour with the tooth shade in an Indian population. The eye colours evaluated were black, dark brown, light brown and grey. Majority of the patients had dark brown eye colour followed by light brown. The most common shade was found to be A2 (31%) followed by A3 (14%), B2 (13%), A1 (10%). Patients with black, dark brown eye generally had A2, A3 shades and patients with grey and light brown eye had A2, A1 and B2 shades. No significant association was found between the eye colour and tooth shades of the patients. This is not in agreement with the conclusion of Hassel who found that a significant association exist between eye color and teeth color [44]. However, their conclusion was based on the results of multivariate analysis, while in a univariate analysis no association was found [44]. An explanation for the result of no association of teeth colour to eye colour is probably that teeth colour is related more to the reflection and absorption mechanisms than inclusion of pigments in its structure, which is true also for the light-coloured eyes [45, 46]. Another study examining the relationship between L\*, C\*, and H\* values and eye and hair color reported inconsistent findings [47]. Based on the report of Wang et al. the eye colour should not be used as a sole criterion to determine the tooth shade [45]. Our present also shows no appropriate correlation between the eye colour and tooth shade. The other variable factors such as age, gender, skin colour, hair colour, should be considered for determination of tooth shade. The hair colour of the patients were evaluated as black, dark brown, light brown, grey. Majority of the patients had black hair colour followed by dark brown. Patients with black and dark brown hair had commonly A2 and A3 shades. Patients with light brown hair had commonly A2 and B2 shades. Patient with grey hair had A3 and A3.5 tooth shades. The comparison between hair colour and tooth colour was found to be statistically significant. These results are similar to Hassel, who found an association of hair colour with the hue component of permanent tooth [44].

## Conclusion

Within the limitation of the study, among the Indian population, A2 was the most common tooth shade in both the young men and women. No conformity between the shade of teeth and eye color was found in this study. There was a relative correlation found between the hair colour and tooth shades. Darker hair colour patients had dark tooth shade. Use of these characteristics is possible in selection of tooth shade, along with other variable factors. Since the study confines only to a limited population, this study can be extended to other regions for a more precise result.

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