Perception of esthetic smile based on the evaluation of relationship between skin tone and tooth shade in esthetics

Sneha Gada¹, Abby Abraham², M. Dhanraj³, Ashish R. Jain⁴*

INTRODUCTION

Harmonizing tooth shade with the skin tone has been considered important to enhance facial aesthetics. Zarb et al. suggested the hue of the artificial teeth should harmonize with the patient’s complexion. The perception among prosthodontist and restorative dentists explains the illusion of greater contrast between the skin color and tooth shade.¹²

Tooth shade is one of the most significant factors affecting esthetics. It is a general misconception in people that white bright teeth are more attractive than yellow teeth. Studies have reported the color of the facial skin serves as a basic guide to tooth shade, contrasted by some studies which report no relationship between skin color and tooth shade. The varying results can be attributed to the difference on the ethnic origin of the population studied or varied perception of people.

Studies involving images of dental arches and facial images that were assessed by lay people versus professionals included dental proportions, dental size and alignment, midline deviation and symmetry of dental arches, gingival horizontal level and shape of the interproximal contacts, dental shape, diastemata, dental shade, buccal corridor, and facial attractiveness.³⁻¹² Among the dental parameters which are considered as key factors in the esthetics of the smile - size, texture, contours, and position of individual teeth - the optical properties of the tooth structure were recognized to be extremely important. It has been stated that bright color of teeth was considered to be a dominant criterion of a harmonious physiognomy. There are studies that indicate differences in the perception of desirable dental shade among patients and professionals and between subjects of different ages, with younger subjects indicating a clear preference for whiter teeth. It is a general misconception in people that whiter bright teeth are more attractive than yellow teeth.¹³

ABSTRACT

Background: Harmonizing tooth shade with the skin tone has been considered important to enhance facial esthetics. Differences in the perception of desirable dental shade among patients and professionals and between subjects of different ages, with younger subjects indicating a clear preference for whiter teeth, have been a misconception for years. The aim of the study is to evaluate the perception of Indian undergraduate students about the correlation between the skin color and the tooth shade.

Aim: This study is an attempt to try and survey the perception of Indian undergraduate students about the correlation between the skin color and tooth shade.

Materials and Methods: A pictorial questionnaire study, a single image of an esthetic smile which was edited using Adobe Photoshop, was shown to 100 subjects belonging to the age group of 20–21 years studying in Saveetha Dental College.

Results: It was noted that extreme variation in the skin tone and tooth shade was not preferred. An average tooth shade and skin tone was preferred by the students.

Conclusion: It may be appropriate to conclude that facial skin color does not significantly correlate with tooth color. However, further research is needed in this field.

KEY WORDS: Perception, Pictorial, Skin tone, Tooth shade, Whiter teeth

¹Department of Prosthodontics, Saveetha Dental College, Saveetha University, Chennai, Tamil Nadu, India, ²Department of Esthetic Dentistry, Saveetha Dental College, Saveetha University, Chennai, Tamil Nadu, India, ³Department of Prosthodontics, Saveetha Dental College and Hospitals, Saveetha University, Chennai, Tamil Nadu, India

*Corresponding author: Dr. Ashish R. Jain, Department of Prosthodontics, Saveetha Dental College and Hospital, Saveetha University, Poonamallee High Road, Chennai – 600 127, Tamil Nadu, India. Phone: +91-9884233423. E-mail: dr.ashishjain_r@yahoo.com

Received on: 11-02-2018; Revised on: 19-03-2018; Accepted on: 10-05-2018
This study is an attempt to try and survey the perception of Indian undergraduate students about the correlation between the skin color and tooth shade. This has a strong clinical significance in the restorative treatment of patients needing a complete denture or any indirect anterior esthetic treatment.

**MATERIALS AND METHODS**

The study was conducted to investigate the relationship between tooth shade and skin color as perceived by students in Saveetha Dental College, Chennai.

A total of 100 subjects belonging to the age group of 20–21 years studying in Saveetha Dental College were selected. A pictorial questionnaire study, a single image of an esthetic smile was edited using Adobe Photoshop.

The tooth shade was altered leaving the skin color constant and following which the skin color was altered leaving the tooth color the same.

The questions further evaluated the students’ understanding on the dependence of tooth shade on skin shade. Students were surveyed to find their opinion on the tooth value preferred for patients varying on the age parameters.

Following this entire survey, the students were specifically questioned to answer which skin tone matched the tooth shade the best. However, it was a trick question where the same images were shuffled and presented to the students.

The statistical analysis was performed using SPSS 20 Software. *Post hoc* power analysis was done using G power version 3.1 to ensure the sample size was adequate.

**RESULTS**

The students chosen had been exposed to a wide range of patients as a part of the clinical hours in their undergraduate dental program. The average age of the students was 20.5 years (20–21 years).

Beginning the survey with pictorial questions was aimed to make the students visually active and understand the questionnaire as it followed.

The students were unaware of the shade morphed in the image. However, on evaluating the statistics, 33% students choose A2 shade and 55% choose the A3 shade. Shade A4 was not chosen at all.

39% choose option D which was the original image and 30% students choose a tone darker 88% students said skin tone plays a role in determining tooth shade 82% students disagreed to the fact that younger individuals should have whiter teeth irrespective of the skin shade 81% students similarly disagreed to the fact that elderly people should have darker and yellower teeth irrespective of the skin color.

Following these questions to direct the perspective of the students toward a correlation of skin color and tooth shade, the 2\textsuperscript{nd} question was reframed and questioned. The students were pictorially asked which skin tone matched the tooth shade the best, wherein only the skin tone was altered keeping the tooth shade the same. The pictures were maintained the same as in question 2. On statistical analysis, it was found that only 63% students chose the same option. This gave a clear inference that the perspective makes a difference in the choice made.

However, it was noted that extreme variation in the skin tone and tooth shade was not preferred. An average tooth shade and skin tone was preferred by the students. This shows that the students did not agree to the contrast concept that a darker skin tone should have whiter teeth. They also opposed to the universal idea that the tooth shade is determined by the age of the individual, indicating that these conclusions should be more individual based.

The SPSS 20 (IBM Co., USA) program was used for analysis of statistical data. The *post hoc* power was calculated to ensure the sample size was adequate.

**SURVEY**

QS 1: Which of the following tooth shades suits the face best?
QS 2: Which of the following smile looks the most natural and esthetic?

QS 3: Does skin color play a role in determining the tooth shade?

QS 4: Do you believe younger individuals should have whiter teeth irrespective of the skin color?

QS 5: Do you believe elderly individuals should have darker and yellower teeth irrespective of the skin color?

QS 6: Which skin tone matches the tooth shade the best?

Tables 1-6 showing the responses of the students to the study questionnaire.

Pie Chart representing the responses of the students.

Table 1: Question 1

<table>
<thead>
<tr>
<th>Option</th>
<th>Frequency (%)</th>
<th>Valid percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option A</td>
<td>12 (12.0)</td>
<td>12.0</td>
<td>12.0</td>
</tr>
<tr>
<td>Option B</td>
<td>33 (33.0)</td>
<td>33.0</td>
<td>45.0</td>
</tr>
<tr>
<td>Option C</td>
<td>55 (55.0)</td>
<td>55.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>100 (100.0)</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Question 2

<table>
<thead>
<tr>
<th>Option</th>
<th>Frequency (%)</th>
<th>Valid percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option A</td>
<td>6 (6.0)</td>
<td>6.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Option B</td>
<td>6 (6.0)</td>
<td>6.0</td>
<td>12.0</td>
</tr>
<tr>
<td>Option C</td>
<td>30 (30.0)</td>
<td>30.0</td>
<td>42.0</td>
</tr>
<tr>
<td>Option D</td>
<td>39 (39.0)</td>
<td>39.0</td>
<td>81.0</td>
</tr>
<tr>
<td>Option E</td>
<td>15 (15.0)</td>
<td>15.0</td>
<td>96.0</td>
</tr>
<tr>
<td>Option F</td>
<td>4 (4.0)</td>
<td>4.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>100 (100.0)</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Question 3

<table>
<thead>
<tr>
<th>Option</th>
<th>Frequency (%)</th>
<th>Valid percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option A</td>
<td>88 (88.0)</td>
<td>88.0</td>
<td>88.0</td>
</tr>
<tr>
<td>Option B</td>
<td>12 (12.0)</td>
<td>12.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>100 (100.0)</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>
DISCUSSION

Tooth color is a crucial factor affecting esthetics. Color is complex and encompasses both subjective and objective phenomenon. The most popular method for describing the color is the Munsell system.\textsuperscript{[14-16]}

The color of the facial skin serves as a basic guide to tooth shade. Data available on the relationship of tooth shade and skin color have very limited information on the diversities based on population perception.\textsuperscript{[17-20]}

The selection of tooth with a proper shade has been shown to positively influence the patient’s esthetic perception and improved prosthesis acceptance.\textsuperscript{[21]} It is suggested that the value of the teeth must correspond to value of the facial skin tone. The lack of this reference makes shade selection procedure a challenging and subjective exercise due to the absence of remaining teeth, which could be a crucial reference for selection of tooth shade during complete or partial denture fabrication.\textsuperscript{[22]} Other factors suggested as guidelines in the dental literature include age, sex, and color of skin, hair, and eye.\textsuperscript{[23,24]} The eye color is disregarded as a guideline by many due to its distance from the dentition. The hair is not a reliable guide due to its rapid change in color compared to the teeth and frequent change of color by the patient.\textsuperscript{[25]} Hence, most researchers have reported skin color as a preferred and predictable reference for teeth selection during complete dentures.

Darker skin complexions have generally been associated with darker teeth while fair complexion individuals with lighter teeth due to the harmony. However, the inverse relation of the tooth with skin color has also been noted.\textsuperscript{[26]} Some authors dismissed the existence of any correlation between facial skin and tooth color. Hence, the patient’s perception while selecting the teeth color in edentulous patients plays an important role. The patient choice is predominantly influenced by many social and psychological factors. The patients tend to select white teeth in developing countries. The existing studies are few and contradict in their observation on the color correlation between...
teeth and skin. Majority of the researches conducted are limited to one ethnic group so the results may not be applicable to other racial groups. Thus, it is desirable to re-evaluate this correlation in the interracial groups with the larger variation of skin color. The study dwelled around the growing awareness, and the changing perception was to evaluate the relationship between tooth color and skin complexion in Arabic, Indian, African, and East Asian populations. The finding of the study will help in the understanding of tooth and skin complexion correlation. The study outcome will help the clinician in selecting teeth in harmony with patient’s skin complexion.[1]

The perception among prosthodontists and restorative dentists that individual with darker skin colors has lighter shades of teeth is purely due to illusion and metamerism.[27]

Tooth color has considerable influence on esthetics, and it is important for satisfactory social rehabilitation of denture wearers.[20] As a result of these, many edentulous adult patients request for white teeth in their denture prosthetics irrespective of the color of the missing teeth and facial harmony.[29] This patient demand should be considered and discussed with them, and if not convinced, their opinion should be respected in accordance with the esthetic wishes and ideas of the patient.[30]

The lack of association between skin color and teeth color recorded in this study suggests that choice of artificial tooth shade may not be confidently made in the patient’s facial skin color. This asserts the finding of Dummett et al.,[31] However, it contrasts that of Hallarman,[32] Jahangiri et al.[17] and Zarb et al.[14] which may be due to the differences in the population surveyed. Hallarman noted that the association between tooth color shade and age may be due to the fact that teeth experience more wear and exposure of dentinal tubules leading to the darker appearance of teeth.[20] Jahangairi et al.[17] also reported a significant association between age and tooth shade with older persons more likely to have teeth with a lower value (darker).[33]

CONCLUSION
It may be appropriate to conclude that facial skin color does not significantly correlate with tooth color and may not be a reliable guide for artificial tooth color selection in this environment. Selection of the shade of artificial teeth for any edentulous patient may, therefore, be a matter of individual judgment.

REFERENCES
24. Sellen PN, Jagger DC, Harrison A. Methods used to select artificial anterior teeth for the edentulous patient: A historical
27. Richardson ME. By their teeth shall ye know them. Br Dent J 2001;191:459-64.

Source of support: Nil; Conflict of interest: None Declared