

Does age determine the lightness and darkness of tooth shades? A retrospective study

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ABSTRACT

The study aimed to analyze whether age determines the lightness and darkness of tooth shades. The demand for esthetics has soared to a next level progressively in many developing countries including India; the importance provided to match the tooth shade creates a great difference in the satisfactory outcome of the patient in the field of dentistry. Therefore, this particular study analyzed the differences in tooth shade values based on age factor among the Indian population. 238 individual's case sheets with the age between 18 and 65 years. 18–30 years of age were considered as group 1 (young adults), 31–45 years in group 2 (middle age), and above 45 years in group 3 (older age). The clinical intraoral pictures of the patients which were taken prior to the treatment were obtained and the shade of any one of the upper permanent central incisors was assessed using the Vitapan 3D-Master shade guide, especially the middle portion of the facial surface of the incisors. The collected data were imported to Statistical Package for the Social Sciences, version 17 (IBM Corporation). Chi-square test was used to assess the significance. From the data, 17.2% showed A1 shade, 35.2% A2 shade, 7.5% A3 shade, 5% A4 shade, 7.1% B1 shade, 15.9% B2 shade, 7.1% B3 shade, 3.3% B4 shade, and 1.1% C1 shade. The individuals under the category of above 45 years showed darker tooth shade compared to young adults and middle age population (Chi-square test, $P < 0.001$). Significant association was established with darker tooth shades by increasing age and vice versa. The older age population showed a higher correlation for dark shade between teeth. The aging process significantly affects the teeth color. Hence, as a dentist, it is important to know about the distribution of tooth shade and its association with age to get an outcome with adequate patient satisfaction.

Key words: Age factor, darkness of shade, lightness, tooth shade

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INTRODUCTION

Tooth color is an important factor to satisfy the patient's demands in terms of esthetics. Multiple factors such as gender, skin tone, and age determine the selection of light and dark tooth shades.^[1] Many studies proved the significant association between age and tooth shade values. Previous literatures establish that there is a positive correlation among elder population who predominantly have darker

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shade and younger people with the dominance of light shade. Earlier studies proved that increasing age showed darkening of tooth shades which can be due to prolonged tooth wear, dietary consumption, intrinsic factors such as enamel and dentin defects, traumatic injury, staining due to drug consumption, extrinsic staining such as smoking, xerostomia, and restorations.^[2] Younger adults attributed to less tooth shade value due to reduced exposure of teeth to the oral environment.^[3] The variation in results can be arrived at due to dissimilarity in origin of ethnicity of participants. Tooth shade selection by dentists in edentulous patients is a relatively simple procedure, but the angle at which the tooth color is viewed is important to yield a satisfactory outcome.^[4]

Our extensive knowledge and experience in the field of research by our team has led to a plethora of high impact publications.^[5-9] The demand for esthetics has soared to a next level progressively in many developing countries including India. The importance provided to match the tooth shade creates a great difference in the satisfactory outcome of the patient in the field of dentistry. Therefore, this particular study analyzed the differences in tooth shade values based on age factor among the Indian population.

Rationale behind this study

To emphasize and implement the fact that tooth color among all patients in accordance to their respective age is a vital factor to be considered while undergoing any sort of restorative dental treatment.

MATERIALS AND METHODS

It is a retrospective study performed after procuring ethical clearance from Saveetha Review Board Committee (SRB/SDC/UG-1730/20/ENDO/053).

Study participants

A total of 238 digital case sheets of the patients who consulted Saveetha Dental College and Hospitals during the period of January 2021–June 2022 were taken. All the patients’ informed consent was obtained before utilizing their reports for the study. The obtained data were further divided into three groups based on age. Age groups of 18–30 were considered as group 1 (young adults), 31–45 years in group 2 (middle age), and above 45 years in group 3 (older age).

Methodology

The clinical intraoral pictures of those patients which were taken prior to the treatment were obtained and the shade of the upper permanent central incisors was assessed using the Vitapan 3D-Master shade guide, especially the middle portion of the facial surface of the incisors. Eye rests between every photograph were taken by looking at the gray walls, to avoid any misinterpretation.

Inclusion criteria

- Patients with the age range of 18–65 years
- Patients with permanent maxillary central incisors
- Photos taken under natural light without camera flash.

Exclusion criteria

- Permanent upper central incisors with restorations, caries, root canal treatment, bleached tooth, and tooth wear such as abrasion, attrition, erosion, and abfraction
- Patients with smoking habits and consuming any form of tobacco.

Data collection and statistics

Data obtained were recorded in a digital sheet and sent to SPSS Inc. Released 2008. SPSS Statistics for Windows, Version 17.0. Chicago: SPSS Inc. The analysis was made using descriptive statistics. The statistical significance was considered, if the $P < 0.001$.

RESULTS

The results of the study are presented in Figures 1 and 2 respectively. Table 1 shows that the percentage of males and females involved in this study is 64.5% and 35.3%, respectively. From Figure 1, 16.74% showed A1 shade, 35.2% A2 shade, 7.5% A3 shade, 5% A4 shade, 7.1% B1 shade, 15.9% B2 shade, 7.1% B3 shade, 3.3% B4 shade, and 1.2% C1 shade.

Table 1: Distribution of gender involved in this study with the standard deviation of 56.86

Gender	Frequency (%)
Male	154 (64.5)
Female	84 (35.3)

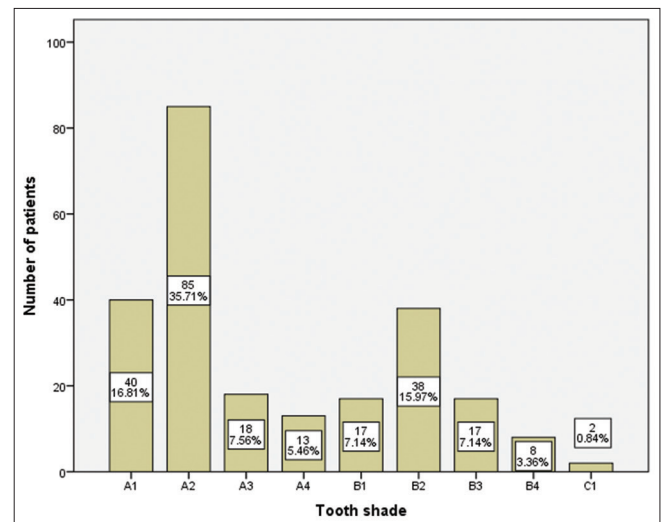


Figure 1: Graph shows the distribution of tooth shade among participants. 16.74% showed A1 shade, 35.2% A2 shade, 7.5% A3 shade, 5% A4 shade, 7.1% B1 shade, 15.9% B2 shade, 7.1% B3 shade, 3.3% B4 shade and 1.2% C1 shade. X-axis indicates the tooth shades of the study population and Y-axis indicates the percentage of the study population. The standard deviation was found to be 2.208

B2 shade, 7.1% B3 shade, 3.3% B4 shade, and 1.2% C1 shade with standard deviation of 2.208. From Figure 2, individuals under the category of above 45 years (Group 3) showed darker tooth shade compared to young adults (Group 1) and middle age groups (Group 2) (Chi-square test; $P < 0.001$; Pearson's R coefficient value of 0.463).

DISCUSSION

The interrelationship of age to tooth shade is crucial to provide a successful esthetic rehabilitation. Hence, this current study tries to enumerate the connection between age and tooth color based on each and every individual. Tooth shade is known to be one of the vital elements in esthetics. For assessing the tooth shade, the center portion of the tooth is the mandatory site as it is a foremost representation of color gradation, incisal edge is predominantly translucent, while cervical edge was modified by scattered light in gingiva.^[10]

In this study, the tendency of darker tooth shade was associated with increasing age. It can be ascribed to secondary dentin formation approximately after 35 years along with loss of enamel due to any form of tooth wear. Age is inversely proportional to the size of the pulp chamber, that is, with increase in age, the size of pulp chamber reduces which is due to deposition of secondary dentin, thereby making the tooth appear highly opaque.^[11] However, few people with younger age showed inherent

darker and yellowish shade that must be considered. Hasegawa *et al.* reported that the tooth color under natural shade showed a noticeable reduction in lightness at the center of the cervical aspect of the tooth and an increase in yellow shade with direct proportionality with age.^[12] Similarly, a study by Jahangiri *et al.* proved a strong correlation between color of the tooth and age of the people. Furthermore, the teeth are liable to become darker in shade with advancing age.^[13] Another literature by Esan *et al.* concluded that frequency of light tooth shade has been declining with age; on the other hand, the frequency of darkening tooth shade was ascending with age.^[14,15] Hassan established that the patients manifesting gray and red-gray colors elevated with increasing age.^[16] The measure of hue, chroma, and value of the tooth was increased in the older age population with an increase in redder color hue.^[17] A recent study by Alsayed *et al.* proved that patients under the age group of 41 years or more predominantly had A3 shade, whereas the majority with the age of between 21 and 30 years showed B3 shade.^[18] Similarly, a study proved that the common tooth shade in elderly people was A3.5.^[19] All the above-mentioned results of various studies were found to be consistent with the findings of the current study.

With respect to the study limitation, a significant association was determined between age and tooth shade. However, other factors such as gender and skin complexion should also be associated with tooth shade to provide a more lifelike prosthesis for the replacement of anterior and posterior teeth.^[20,21] Furthermore, the various other shade guides affect the determination of tooth shade.^[22-24]

CONCLUSION

The significant association was established with darker tooth shades by increasing age and vice versa. The elder population showed a strong association for dark shade between teeth. The aging process significantly affects the teeth color. Hence, as a dentist, it is important to know about the distribution of tooth shade and its association with age to get an outcome with adequate patient satisfaction.

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Conflicts of interest

There are no conflicts of interest.

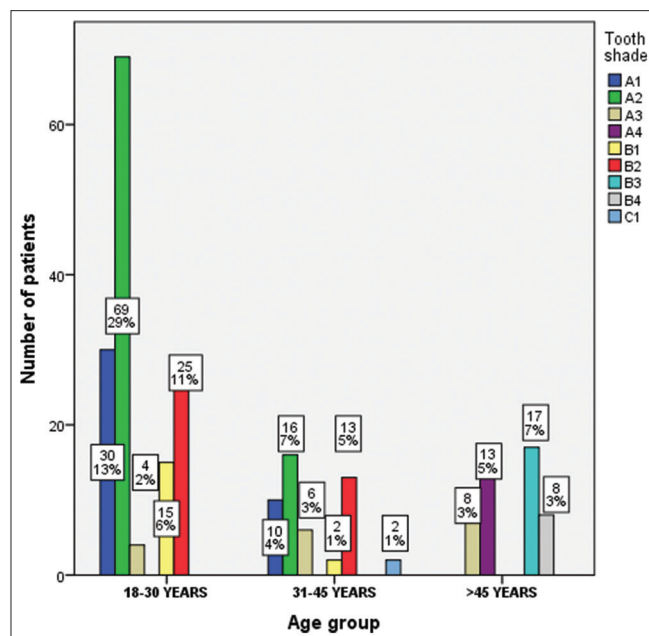


Figure 2: Graph shows the association of age and tooth shade among participants. X-axis indicates the age of the study population and Y-axis indicates the percentage of the study population. The individuals under the category of above 45 years (Group 3) showed darker tooth shade compared to young adults (Group 1) and middle age groups (Group 2) (Chi-square test; $P < 0.001$; Pearson's R coefficient value of 0.463)

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