

Evaluation of Tooth Shade in an Indian Population and its Correlation With Age, Gender and Skin Colour- Submission

Research Article

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Abstract

Aim: Tooth shade selection is critical for esthetic rehabilitation of smile. Tooth shade varies with racial origin and this in turn is influenced by various factors such as age, gender and skin colour.

To evaluate the tooth shade in Indian population and its correlation with age, gender, skin colour.

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. Age and gender of the patient were noted. Skin colour of the patient was recorded according to Fitzpatrick classification of skin colour. The recordings were tabulated and the results were calculated. The statistics was done using SPSS software.

Results: In the study population, people aged between 21-40 years most commonly had A2 shade (41.3%), 41-60 years had A3 shade (27.6%), and people more than 60 years had A3.5 shade (50.0%). A2 shade was the most common shade found in both males (25%) and females (34.4%). Population with Type I,II,IV,V skin tone have A2 shade (50%,36.4%,30%,26.7% respectively). Only age ($p = 0.002$) and gender ($p = 0.018$) were found to have the significant correlation with the tooth shade. There was no significant correlation found between skin colour and tooth shade ($p=0.595$).

Conclusion: The study showed that the most common tooth shade for population between ≤ 20 years, 21-40 years, 41-60 years and >60 years was B1, A2, A3 and A3.5 respectively. A2 was found to be the most common teeth shade both in males and females. Individuals with Type I,II,IV,V skin colour had A2 as the most common tooth shade.

Keywords: Age; Gender; Indian Population; Skin Colour; Tooth Color.

Introduction

The word "Esthetic" is concerned with the appreciation of beauty or with beauty and it is a regularly used term in dentistry to describe restoration and prosthetic replacement of tooth [1]. To achieve clinical success in terms of esthetics in prosthetic and restorative dentistry, one need to master the art of creating attractive and natural dental appearance [2]. Role of tooth colour on facial esthetics should not be overlooked. It is important to achieve satisfactory restoration especially among patients with complex expectations. Many factors influences shade selection, the source of light under which tooth is assessed being one of the major

factors [3]. The next variable which can influence the shade selection process is the clinical skill of the operator and the choice of shade guide system [4]. The natural teeth are discoloured due to intrinsic factors which include amelogenesis and dentinogenesis imperfecta, environmental factors such as tetracycline staining, traumatic injury, dental caries, and aging. They may also experience discolouration due to extrinsic factors such as diet, smoking, xerostomia, and restorations. These discolorations influence and alter the decisions on the tooth shade for a final restoration [5].

Considering the harmony between tooth colour and soft tissues, the tooth colour along with the skin colour has to be recorded

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for an aesthetically successful facial restorations [6]. Colour of skin tone plays a major role in tooth shade selection. Individuals with darker skin colour are perceived to have lighter teeth shade by dentists [7]. This perception can be attributed to the illusion of greater contrast between tooth shade and skin colour. Various research articles state that a valuable attention should be given towards the racial distributive pattern of tooth shade. Every dentist has a perception on smile attractiveness which influences shade selection of tooth [8].

Aging has a substantial impact on the tooth shade selection. With the increase in age, the teeth shade value decreases, translucence decreases and opacity increases [9]. Generally, lighter shade of teeth is recommended for younger patients and darker shades for geriatric patients. This is due to the fact that with age the dentin thickness increases resulting in smaller pulp chamber [6, 10]. Gender is yet another factor, significantly connected with tooth shade values [11]. Literature search reveals that men are more likely to present with darker tooth shade values whereas women of the same age group were more likely to show lighter tooth shade values [12].

Our understating about the dental shade is completely based on the studies obtained from western population. However, with increasing dental awareness and demand for esthetics in developing countries like the Indian subcontinent, research in the field of esthetics based on a local population has become the need of the hour [13]. Furthermore, limited literature or research work is available in our population in this regard. Hence the aim of this study was to evaluate the tooth shade in Indian population and its correlation with age, gender, skin colour. If such an association is established, this information will be utilized in restorative and prosthetic rehabilitation.

Mateials And Methods

A cross-sectional, analytical study with a non-probability convenient sampling technique, conducted in the institution, for a duration of 2 months. Our sample size consisted of 100 patients, who visited for a routine dental checkup. The present project was approved at the Ethics Committee of Saveetha Institute of Medical and Technical Science (SRB/SDBDS/FINAL/17-18/0295). The procedures followed were in accordance with the ethical standards of the committee and with the Helsinki Declaration of 1975. A written consent of each participant was obtained prior to the commencement of the assessment and the confidentiality of the information was maintained.

The cross-sectional study consisted of a sample size of 100 individuals belonging to both genders. Individuals in the age range of 16 years to 55 years with at least one completely erupted permanent maxillary left or 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 Classical shade guide. To avoid error the recording was done af-

ter drying the teeth with cotton. Skin colour was assessed on the dorsum of the hand. Skin colour was matched using the Fitzpatrick classification. Skin color was divided into 6 categories: Type 1 (pale white skin), Type 2 (white skin), Type 3 (light brown skin), Type 4 (moderate brown skin), Type 5 (dark brown skin), and Type 6 (dark brown to black skin) [2].

All shade readings were made preferably between 10:00 PM and 12:00 noon to get the maximum effect of the natural sunlight. Shades were established within 1 to 2 minutes [14]. Only ten patients were evaluated in a day to reduce operator fatigue.

The data obtained was entered into the computer and statistical analysis was done using a statistical package of social sciences (SPSS) software. Cross-tabulations and chi-squared tests were used to analyse the significance of the participant choices and the influence of socio-demographic variables on the selected teeth shades. A p-value of ≤ 0.05 was considered significant.

Results

The age of the individuals was divided into four groups as ≤ 20 years, 21-40 years, 41-60 years and > 60 years comprising of 2 patients, 63 patients, 29 patients, and 6 patients respectively in these groups counting a total of 100 patients. The tooth shade of patients less than ≤ 20 years were found to be B1 and B2 shades. The tooth shade of patients from 21 to 40 years had majority of A2 shade. Patients from 41 to 60 years had a majority of A3 [Table 1]. Patients ≤ 60 years had majority of A3.5 shade. The chi square value showed a significant difference of 0.002

Considering the gender, A2 was the most common tooth shade among both male and female study population with 25% and 34.4% respectively [Table 2]. The chi square values showed significant results between tooth shade and gender (0.003).

The skin colour was recorded according to the Fitzpatrick classification [Table 3]. Type IV was found to be the most common skin colour in 40% of the study population. A2 was the most common tooth shade for Indian population with Type I, II, IV and V skin colour. Most of the study population with Type III skin colour had A3 tooth shade. The chi squared values showed insignificant correlation of tooth shade and skin shade (0.595).

Discussion

Color is a property of light. Objects have no color of their own; they just reflect a particular wavelength from the color spectrum [15]. As the light reflected from the objects enters the eye, cornea, lens, retina, iris, and the area around fovea centralis work together to help appreciation of the object and to discriminate the colour [16].

Colour measurement in dentistry can be done in two ways, visual and instrumental. Various colour measuring devices used in dentistry includes digital camera, stereomicroscope, colorimeters, digital spectrophotometers and spectroradiometers [17, 18]. Digital camera has filters where colorimeter works on the principle of charge couple devices [19]. Spectrophotometers and spectroradiometers [20] consists of a single photodiode detector that records the amount of light at each wavelength [18]. The vari-

Table 1. Cross tabulation of age and tooth shade.

Age group	Tooth shade											Total
	A1	A2	A3	A3.5	A4	B1	B2	B3	B4	C1	C2	
< 20 YEARS n (%)	0	0	0	0	0	1 50.00%	1 50.00%	0	0	0	0	2 100.00%
21 - 40 YEARS n (%)	10 15.90%	26 41.30%	4 6.30%	3 4.80%	0	5 7.90%	9 14.30%	0	1 1.60%	4 6.30%	1 1.60%	63 100.00%
41 - 60 YEARS n (%)	0	5 17.20%	8 27.60%	5 17.20%	1 3.40%	1 3.40%	3 10.30%	2 6.90%	0	1 3.40%	3 10.30%	29 100.00%
> 60 YEARS n (%)	0	0	2 33.30%	3 50.00%	0	0	0	1 16.70%	0	0	0	6 100.00%
Total n (%)	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 gender and tooth shade.

GENDER	TOOTH SHADE											Total
	A1	A2	A3	A3.5	A4	B1	B2	B3	B4	C1	C2	
MALE Count	0	9	6	5	1	1	7	1	1	1	4	36
%		25.00%	16.70%	13.90%	2.80%	2.80%	19.40%	2.80%	2.80%	2.80%	11.10%	100.00%
FEMALE Count	10	22	8	6	0	6	6	2	0	4	0	64
%	15.60%	34.40%	12.50%	9.40%		9.40%	9.40%	3.10%		6.30%		100.00%
TOTAL Count	10	31	14	11	1	7	13	3	1	5	4	100
%	10.00%	31.00%	14.00%	11.00%	1.00%	7.00%	13.00%	3.00%	1.00%	5.00%	4.00%	100.00%

Table 3. Cross tabulation of skin colour and tooth shade.

SKIN SHADE		TOOTH SHADE											Total
		A1	A2	A3	A3.5	A4	B1	B2	B3	B4	C1	C2	
I	Count	1	7	1	1	0	1	1	1	0	1	0	14
	%	7.10%	50.00%	7.10%	7.10%		7.10%	7.10%	7.10%	0.00%	7.10%	0.00%	100.00%
II	Count	0	4	2	1	0	1	2	0	0	0	1	11
	%		36.40%	18.20%	9.10%		9.10%	18.20%				9.10%	100.00%
III	Count	3	3	4	2	0	1	1	0	0	3	0	17
	%	17.60%	17.60%	23.50%	11.80%		5.90%	5.90%			17.60%		100.00%
IV	Count	6	12	6	1	0	2	7	2	1	2	40	
	%	15.00%	30.00%	15.00%	2.50%		5.00%	17.50%	5.00%	2.50%	2.50%	5.00%	100.00%
V	Count	0	4	1	5	1	1	2	0	0	0	1	15
	%	0.00%	26.70%	6.70%	33.30%	6.70%	6.70%	13.30%				6.70%	100.00%
VI	Count	0	1	0	1	0	1	0	0	0	0	3	
	%		33.30%		33.30%	0.00%	33.30%					100.00%	
Total	Count	10	31	14	11	1	7	13	3	1	5	4	100
	%	10.00%	31.00%	14.00%	11.00%	1.00%	7.00%	13.00%	3.00%	1.00%	5.00%	4.00%	100.00%

ous shade tabs available includes custom shade guide, ideal shade guide, Shofu shade guide (based on the natural colour concept) [21], Vita Classical (uses hue value), Vita 3D-Master shade guide (tabs arranged based on chroma and value) [15] and VITA easy shade guide.

Shade tabs in a shade guide are matched to teeth in the order of value, hue, and chroma. "Hue" is the quality that differentiates one family of color from another. Hue is a physiologic and psychologic interpretation of a sum of wavelengths. Hue is represented by A, B, C or D on the commonly used Vita Classic shade guide. Value or brightness, is the amount of light returned from an object. Chroma is the saturation, intensity or strength of the Hue [22]. VITAPAN classical shade guide was used for the research since it determines the correct tooth shade quickly and precisely. The modern design and systematic structure of the VITAPAN

classical shade guide enabled the appropriate shade identification. The VITAPAN classical shade guide facilitates the changeover from traditional shade-taking systems to the precise shade determination. The shade guide has a classical, linear handling. These shade guides are very easy to use as it is self-explanatory and simple. The shade guide is reliable and fast. Precise shade can be determined rapidly. The VITAPAN classical shade guide has a modern design and is an expression of perfect esthetics and a clear structure. The Fitzpatrick scale remains a recognized tool for dermatological research into human skin pigmentation and is based on the response of different types of skin to ultraviolet (UV) light [23]. The back of the palm was used in observing the skin colour so that the area was free of makeup or makeup residues [1].

This study shows that individuals with Type I, Type II, Type III,

Type IV, Type V, Type VI represents pale white skin, white skin, light brown skin, moderate brown skin, dark brown skin and dark to black skin as follows. A2 was the most common tooth shade for Indian population with Type I,II,IV and V skin colour. The current study identifies that individuals with lighter skin shade have lighter teeth shade which is in accordance with previous studies [24].

The tooth shade of patients less than ≤ 20 years were found to be B1 and B2 shades. The tooth shade of patients from 21 to 40 years had majority of A2 shade. Patients from 41 to 60 years had a majority of A3. Patients ≤ 60 years had majority of A3.5 shades. These results indicates that the teeth darkens as the age of the patients advances which is in accordance with previous studies [2, 5, 14, 25]. In the present study, A2 was found to be the most frequently seen shade among male and female study population in the age group 18-40 years. This is in contradiction to earlier studies where men were found to have darker teeth shades in comparison with female. [26] In an African population older adults and men were found to have darker teeth [25].

Difference in choice of shade guides in various studies interferes with the comparison of tooth shade in various racial groups. Pakistani population were found to have 2M1 as the most common tooth shade which was recorded using VITA 3D master shade guide [27]. Among Sudanese population A3 was the most common classical tooth shade. The shade was recorded using VITA easy shade guide [28, 29]. Spanish population showed 3M1 as the most frequent tooth shade when measured with easyguide spectrophotometer [30].

Our team has numerous highly cited publications on well-designed clinical trials and lab studies on various topics in the past couple of years [31-45]. This provided us with the right platform to pursue the current study. Our institution is passionate about high quality evidence based research and has excelled in various fields [46-55].

Conclusions

Within the limitations of the study it was concluded, that the most common tooth shade for this population between ≤ 20 years, 21-40 years, 41-60 years and > 60 years was B1, A2, A3 and A3.5 respectively. A2 was found to be the most common teeth shade both in male and female population. Individuals with Type I,II,IV,V skin colour had A2 as the most common teeth shade.

Acknowledgments And Declarations

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