

The study was performed at Islamic Azad University Dental Branch of Tebran; Tebran, Iran.

# Relationship Between Natural Tooth Shade and Skin Colour

M. Nourbakhsh\*, N. Mousavinejad†, A.R. Adli† and M. Harati†

**Abstract** - The purpose of this study was to assess the correlation of skin colour and tooth shade. One hundred and twenty six individuals aging between 18 to 25 years participated in this study. Colour of the maxillary central incisors was examined by VITA easy shade. Tooth shades were assigned to four ordinal values. Nivea Beauty Protect Foundation shade sample was used as a guide to assess facial skin colour. Skin colours were also assigned to four ordinal values. Spearman test revealed that there was a significant relationship between tooth shade and skin colour. Total co-relation factor was 51.6% ( $p < 0.01$ ). Co-relation factors were 57% for women and 27% for men ( $p < 0.01$ ). The highest tooth shade prevalence belonged to the second group and the highest skin colour prevalence was also in the second skin colour group.

KEYWORD: Tooth shade, skin colour, VITA easy shade /3-D Master).

## INTRODUCTION

Complete denture treatment demands knowledge of applied basic science, biomaterials, occlusion, and aesthetics. Aesthetics of denture influences patient adaptation and convenience. Colour matching and reproducing natural teeth aesthetic is one of the most challenging tasks in restorative dentistry<sup>1</sup>. Naturally removing or preserving teeth dictates the colour, size and shape of artificial teeth, yet this method cannot be used for edentulous patients.<sup>2</sup>

Tooth colour can be determined by different methods, such as the use of visual comparison by various shades and method based on computer generated information<sup>3-5</sup>. However, shades cannot represent the colour space of natural dentition<sup>6</sup> because the colour range of dental shades is very narrow<sup>7</sup>. Yet they are popular for assessing the colour of teeth in dentistry<sup>8,9</sup>. Moreover, colorimeter or spectrophotometer can determine colour variation<sup>10</sup> but their extreme accuracy confuses clinicians because different readings are recorded within 1 to 2 mm distance per individual tooth<sup>11,12</sup>.

The colour of the teeth must be in harmony with patient's skin, hair, and eye colour<sup>13-16</sup>. Several studies have been conducted to assess the relationship between tooth colour and skin colour. Authors have discussed that the tooth shade and skin colour are inversely related for different races.<sup>9</sup> Others have suggested that facial skin complexion does not correlate significantly with tooth colour and is a poor predictor of gingival pigmentation<sup>17</sup>. Some studies have shown that the determination of tooth colour from hair and eye colour and from gender in the white elderly

was only partially possible<sup>18</sup>. Others have stated that tooth colour and skin colour were inversely related in Black African population<sup>19</sup>. By the same token, it seems that more studies are necessary because of conflicting results of studies and increased attention to the aesthetics of restorations. Therefore, we decided to investigate correlation of skin colour and tooth shade in a sample of Iranian population. The null hypothesis of the present study was that skin colour and tooth shade would not be related.

## MATERIAL AND METHODS

### Overview

The study was peer-reviewed and approved by our local board of ethics and research methodology. One hundred and twenty six subjects participated in the study by sequential sampling from patients and students of Tehran Azad University in 2005-2006. Gender and age of all the subjects were recorded. All participants signed informed consents in advance. The examiner was calibrated for tooth shade and skin colour assessment.

### Inclusion and exclusion criteria

Subjects should have at least one intact maxillary central without any restorations, abnormalities, crack lines and mottled enamel. Patients with teeth that had extrinsic stain (e.g. from cigarette staining) or intrinsic stain (e.g. from tetracycline staining) and required or had received endodontic or bleaching therapy were excluded from the study. The patients who had tanned skin or traumatic discolored skin or who had undergone radiotherapy or orthodontic therapy were also excluded.

\* DDS, Ms

† DDS

### Facial tone

Nivea Beaute Beauty Protect Make-Up Foundation (Beiersdorf AG, Hamburg, Germany) was used as a guide to assess facial skin colour. Skin colour evaluations were also obtained from the wrists of patients to ensure accuracy of facial skin colour assessment. Skin colours were divided into four ordinal categories (fair = 1, fair-medium = 2, medium = 3 and dark = 4) based on the Nivea shade guide which shares the same classification.

### Dental tone

Then VITA easy shade /3-D Master, VITA Zahn Fabrik, Bad Sackingen, Germany) was used for tooth shade measurement. After the tooth (maxillary central incisor) had been polished free of plaque and dried with gauze. Teeth were then divided into four categories according to VITA pan 3-D Master shade guide based on their tone value. VITA pan 3-D Master originally has five value orders where 1 represents the highest value and 5 the lowest. The orders four and five were merged into one group so the total number of orders in the present study was 4 as follows: highest = 1, high = 2, medium = 3, and low = 4 in decreasing order of value.

### Statistics

The Spearman test was used to analyse our findings.  $p$  value  $< 0.05$  was considered as statistically significant.

## RESULTS

The age of patients ranged between 18 and 25 with a median of 22 years at the time of examination. The prevalence of tooth shade and skin colour in each group of the present study is shown in table 1.

The most prevalent tooth shade was group 2 (64.3%). Other tooth shade groups consisted of 10 participants in group one (7.9%), 33 participants in group three (26.2%) and 2 participants in group four (1.6%).

The most prevalent skin colour prevalence was shown in group 2 (36.5%). Other skin colour groups included 34 participants in group one (27%), 24 participants in group three (19%) and 22 participants in group four (17.5%).

Spearman test revealed that there was a significant relationship between tooth shade and skin colour. Total co-relation factor was 51.6% ( $p < .01$ ). Co-relation factors were 57% for women and 27% for men ( $p < .01$ ). This might reflect a stronger correlation between the skin color and tooth colour in young males compared to females.

## DISCUSSION

The present study showed significantly positive correlation between tooth shade and skin colour. The findings of the present study are different from those of Jahangiri et al. They indicated that tooth shade value and skin colour were inversely related<sup>9</sup>. They used Vita-Lumin shade guide to evaluate the shade of maxillary right/left central incisors. Although, the most acceptable and frequent method for choosing tooth colour is using shade guide<sup>2</sup>, it is not without its disadvantages. Tooth shade guides have limited colours and rely on subjective visual matching<sup>20</sup> which has not shown to be of sufficient reliability and consistency<sup>21</sup>. To improve the reliability of shade selection procedure, Vita pan 3-D Master was used in the present study. Function of 3-D Master is independent of external light source. Also, make up does not affect its results. These advantages make it more reliable than classical Vita pan.

Inconsistent to the findings of Jahangiri et al. and those of the present study, Guesson et al stated that there was an inversely relation between tooth and skin colour in black African population<sup>19</sup>. The inconsistency of the findings, while very interesting, is thought to be attributable merely to the racial differences. Nonetheless, Dummet et al indicated that facial skin complexion might be a poor clinical indicator of tooth colour and not reliable in the tooth shade selection for Afro-American patients<sup>17</sup>. They examined six maxillary anterior teeth using shade guides.

The selection of maxillary central incisor in the evaluation of tooth colour in the present study was based on the suggestions of the literature<sup>22</sup> but it appears that maxillary central incisors may not represent the overall tooth color<sup>1</sup>. In another study, it was discussed that the determination of tooth colour from hair and eye colour and from gender in the white elderly was partially possible but facial complexion could not help to predict natural tooth color<sup>18</sup>. In this study, the teeth were only wiped with gauze and not professionally cleaned. In the present study, however, all central incisors were polished and cleaned to reduce the

**Table 1.** Tooth and skin colour prevalence in the patients and students of Tebran Azad University

		Skin color				Total	
		1	2	3	4		
Tooth Colour	1	Count	6	3	0	1	10
		% of total	4.8%	2.4%	0%	8%	7.9%
	2	Count	28	35	10	8	81
		% of total	22.2%	27.8%	7.9%	6.3%	64.3%
3	Count	0	6	14	13	33	
	% of total	0%	4.8%	11.1%	10.3%	26.2%	
4	Count	0	2	0	0	2	
	% of total	0%	1.6%	0%	0%	1.6%	
Total	Count	34	46	24	22	126	
	% of total	27.0%	36.5%	19.0%	17.5%	100%	

effect of extrinsic stains. Authors have recently evaluated linear regression models in dentate patients to predict central incisor shades for edentulous patients<sup>23</sup>. Consistent to the findings of the present study, gender was found to be a statistically significant predictor of natural colour of maxillary central incisors. Age was also found to be a contribution in this prediction. The present study, however, did not concern the factor of age in assessments. The study group was limited to young people. Complexion of face skin and tooth colour especially value of tooth may change in older patients.

There are several limitations in our study. Although tooth shade evaluation by Vita pan 3-D Master is the most reliable option based on the literature, the significance of the results could be limited by edge-loss effects of the device. This might result from the flat shape and size of the probe tip in comparison with convex tooth surface. This could be compensated for by examining the entire tooth surface rather than just one area as was done in this study. Authors have found significant superiority in the reliability of shade detection devices. VITA Easyshade has shown more accurate results compared to other devices<sup>24</sup>. It is now possible to measure tooth colour objectively due to the application of colour science in dental medicine. Several researchers have tried different techniques such as spectrophotometers, colorimeters and image analysis of digital images for this purpose<sup>25</sup>.

## CONCLUSION

The findings of this study stated that there was a significant positive relationship between tooth shade and skin colour.

## ACKNOWLEDGEMENT

The authors would like to thank Pooyan Sadr-Eshkevari /DDS, Director of the Dental Section of Farzan Clinical Research Institute for technical assistance.

## ADDRESS FOR CORRESPONDENCE

Mehran Nourbakhsh, DDS, Ms. Assistant professor, Department of prosthodontics, Islamic Azad University Dental Branch, Tehran, Iran. E-mail: mehran.nourbakhsh@yahoo.com

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