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Dentistry

TOOTH SHADE & ITS CORRELATION WITH SKIN COLOR – ITS PERCEPTION ON SMILE ATTRACTIVENESS

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ABSTRACT

Introduction: Shade selection is a crucial step in providing patients with a cosmetic restoration that blends in seamlessly with their dentition. Natural teeth are known to possess different shades. Many factors affect the color of natural teeth. One of the most critical variables and most often ignored is light. Another aspect that can affect the colors of natural teeth is the color imparted by different skin complexions. The objective of this study was to determine if skin tone and tooth color had the same influence on smile attractiveness.

Materials And Methods: A photograph of a woman's smile was digitally modified to obtain 16 images. Using the MAC color code as a reference, the skin tone was changed to four different tones (NW25: light, NC42:light medium, NW43:medium dark, NW50:dark), and the tooth shade was changed to four different tones (A1, A2, A3, A4) using the VITAPAN Classical shade guide. A total of 94 people completed a Google form questionnaire in which they scored each picture on the Visual Analog Scale for attractiveness.

Results: Images NW25A1 and NW43A4 obtained the highest and lowest visual analog scale values, respectively.

Conclusion: The overall results suggest that, regardless of the skin color, a lighter tooth shade has a major impact on smile attractiveness.

KEYWORDS : Aesthetics, skin color, tooth shade, smile attractiveness, shade guide.

INTRODUCTION

In all fields of dentistry, the development of a pleasing yet natural looking smile has become a vital treatment success criterion. Smile is considered an expression of utmost importance in reflecting an individual's personality.[1] It is reported that patient's show a desire for pearly white teeth as they are associated with high levels of social competence, intellectual ability, adjustment, and relationship status.[2]

The selection of teeth with a proper shade has been shown to influence patient's esthetic perception positively and improve treatment prognosis.[3]

Shade matching is a complex phenomenon, which encompasses both subjective and objective characteristics.[4] It is influenced by the absorption and scattering of the light in the tooth structure, the shape and thickness of its hard tissues, tooth type or place in the dental arch, and the geometry of the tooth surface and its reflectance.[5]

Factors such as age, gender, ethnicity, facial complexion, and skin color play a crucial role in influencing the accuracy of shade matching. The skin color varies from almost black to white with a yellowish or a reddish tint, due to the presence of carotene and melanin pigments in the skin and the presence of oxy and deoxyhemoglobin in the blood vessels.[6]

However, there is limited evidence to implicate skin color, as a factor influencing shade perception. So, the purpose of this clinical study was to determine if skin tone and tooth color had a similar influence on the perception of smile attractiveness. The research hypothesis was that skin tone and tooth color had the same influence on smile attractiveness.

MATERIALS AND METHODOLOGY

A young woman (24 years) with an aesthetic smile was recruited for the study. A standardized frontal view smile photograph was taken using a digital camera (D7000; Nikon Corporation) in ambient light. The camera was positioned and adjusted to obtain a sharp image of the face from the tip of the nose to the tip of the chin. The camera was stabilized with a tripod at a fixed distance of 60cm. The subject was asked to smile and the images were captured. The images were downloaded to a computer and were digitally modified to create a range of smiles with varying skin and tooth shades using software Adobe photoshop 7.

The skin color was altered to create 4 common tones - light, light medium, medium dark, and dark corresponding to NW25, NC42, NW43, and NW50 of the MAC color code. The tooth shade was modified to create 4 tones using the hue A selected from the VITA Classical A1-D4 system. Thus, 16 images were obtained (Figure 1).

Figure1 Digitally modified images created from the combination of different teeth shade (A1, A2, A3, and A4 of VITAPAN Classical A1-D4 system) and skin tone (NW25, NC42, NW43, and NW50 of MAC color code).

The data was collected from 94 participants which included, 52 dentists and 42 laypeople. Participants below 18 years of age and color blind people were excluded from the study.

The data was collected by a questionnaire through google forms. It included the Ishihara test (Figure 2) which is a color perception test for identifying people with red-green color deficiencies. It consists of Ishihara plates which are a circle of colored dots forming numbers, visible to individuals with normal vision, and not visible to those with defective vision.

The questionnaire also comprised 16 edited smile images arranged in a random sequence and one of them was duplicated to assess the intraexaminer reliability.

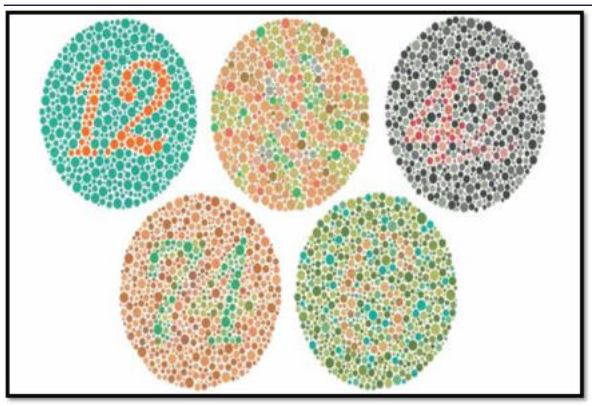

Figure 2 Ishihara Test

After each image, the participants were questioned as to how attractive they found the smile, and their responses were recorded on a Visual Analog Scale (VAS) ranging from a score of 0 to 10 where 0 denoted least attractive and 10 denoted most attractive (Figure 3).

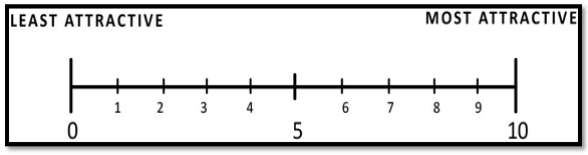

Figure 3 Visual Analog Scale(VAS)

Statistical Analysis

The data was subjected to statistical analysis using SPSS software (Version 20.0; SPSS Inc) with a P value significance of <0.05. The VAS values of the 16 tested images were compared with a multiple comparison ANOVA test plus Bonferroni post-hoc test for sex, profession. A Chi square test was done to evaluate the most chosen images.

RESULTS

The results revealed that the image NW43A1 showed the highest mean VAS values while image NW42A4 obtained the lowest mean values as illustrated in Figure 4.

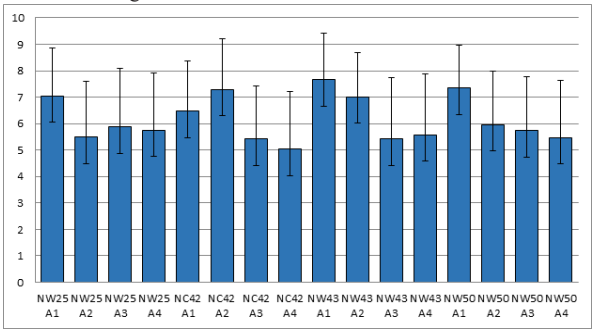

Figure 4 Comparison Of Mean Ratings Of All Images

Table 1 demonstrated that Image NW43A1 showed the highest VAS values (76±17) while image NW42A4 (51±21) obtained the lowest values. Table 1 also showed that independent from the skin tone the preferred tooth shade is always A1(the brighter shade) over all others. On the contrary, lower VAS values for skin tone are almost always associated with tooth shade A4 (the darker shade).

Table1 Mean VAS Values

S.No.	Image	Skin Color	Tooth shade	Mean	S. D
1.	NW43 A1	NW43	A1	76	17
2.	NW50 A1	NW50	A1	73	16
3.	NC42 A2	Nc42	A2	72	19
4.	NW25 A1	NW25	A1	70	18
5.	NW43 A2	NW43	A2	70	16
6.	NC42 A1	NC42	A1	64	18
7.	NW25 A3	NW25	A3	59	22
8.	NW50 A2	NW50	A2	58	20
9.	NW25 A4	NW25	A4	57	21
10.	NW50 A3	NW50	A3	57	27
11.	NW43 A4	NW43	A4	56	23
12.	NW25 A2	NW25	A2	54	20
13.	NW50 A4	NW50	A4	54	21
14.	NW43 A3	NW43	A3	52	23
15.	NC42 A3	NC42	A3	51	20
16.	NC42 A4	NC42	A4	51	21

Note: Skin tone NW25: Light, NC42: Light medium, NW43: Medium dark, NW50: Dark. Tooth shade from brightest to darkest: A1, A2, A3, and A4 using the hue A(red-brown) of VITA Classical A1-D4 shade guide.

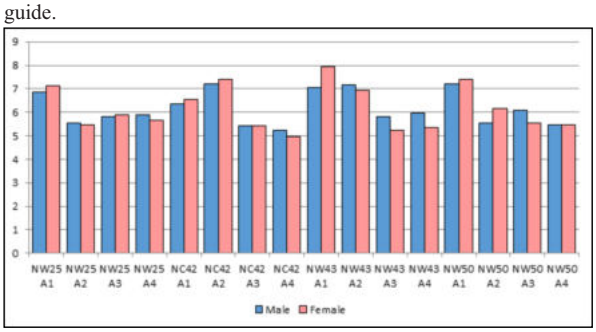

Figure 5 Comparison Of Male And Females With Mean Ratings Of All Images

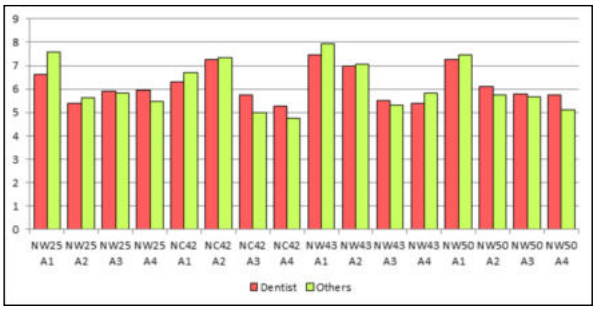

Figure 6 Comparison Of Male And Females With Mean Ratings Of All Images

No statistically significant difference (P<0.05) was observed in the mean VAS values according to variable sex or profession as observed in Figure 5 and Figure 6 respectively.

DISCUSSION

Tooth shade is one of the critical factors affecting aesthetics. The tooth shade complimenting the skin tone is essential for aesthetically successful facial restorations.[7] It is the psychophysical outcome of both optical properties of teeth and the observer. The physical properties of light and hard tissues affect the tooth shade. The perceived color is also influenced by the psychological precondition of an individual .[8]

The hypothesis of this study was that skin tone and tooth shade had the same influence on smile attractiveness. The results of the study contradicted this hypothesis, demonstrating that, regardless of skin color, the favored tooth color was often the brighter (higher VAS), with darker teeth having significantly lower values.

The results of this study are in correlation with those of Dummet et al[9] and Hassel et al[10] who found no relationship between skin and tooth color. The highest VAS values were found for images with darker skin and lighter tooth shade, this is in contrast to a study conducted on a sample of 140 participants by Sabherwal et al,[11] where this combination was seemed to be less attractive.

The visual analog scale (VAS) was used to rate the images in this study as it is one of the most popular and widely used methods. This is probably because it is simple and inexpensive.[12]

Different studies, categorized skin tone, according to different cosmetic indexes, used to compare skin color with samples, such as NIVEA, LAKME, or L'Oreal.[13]

In the present study, the MAC color code was selected as the range appeared to apply to a wider spectrum of skin tones than other shade guides within the cosmetic industry.

Vitapan Classical shade guide (Vident) is a gold standard in dentistry that was used in the present study. Vitapan Classical shade tabs are divided into four groups, with primary group division based on hue.[14] Within the groups, tab arrangement is based on increasing chroma. The A shade was chosen as it has been reported by many authors to be the most frequently used and therefore the closer to natural teeth color shade.[15]

The main limitations of this study are the nature of the enrolled population (composed of only Indians) and the lack of a well-categorized reference scale for skin tone. Only Indian subjects were enrolled in this study as the population attending Mamata Dental College comprised entirely of Indians.

Even if no substantial relationship between ethnicity and attitudes toward dental aesthetics has been found in the current literature, future studies should focus on investigating if these findings vary in different cultures and with a more diverse sample.

CONCLUSION

Within the limitations of the study, a brighter tooth shade considerably influences the smile attractiveness independent of the skin tone. Variations in tooth and skin tone, as well as their combination, can have a significant impact on the perceived attractiveness of a smile.

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