



ORIGINAL ARTICLE

Assessment of the influence of gender and skin color on the preference of tooth shade in Saudi population



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Abstract *Aim:* The aim of the study was to evaluate the influence of gender and skin color on the preference of different teeth shades in general population.

Materials and methods: Two standardized frontal smile photographs of male and female subjects were manipulated using photoshop to represent 4 skin colors [(type II, III, IV, and V) (Fitzpatrick scale)]. The teeth shades under each skin color were digitally manipulated to represent one of 6 teeth shades (BL1, BL2, BL3, BL4, B1 and A1). A questionnaire assessed demographic characteristics (age, nationality, gender, education level, occupation, and income) along with the satisfaction of their smiles. Male and female set of pictures with combination of skin colors and teeth shades were presented and participants were asked to select the most esthetically pleasing teeth shade with regard to gender and skin color. Cross-tabulations and chi-squared tests were used to perform the statistical analyses ($\alpha = 0.05$).

Results: Three hundred and thirty-six (60.4% male; 39.6% female) individuals participated in the study. The difference in the preferred teeth shades was significant among the male and female photographs across all skin colors ($p < 0.05$). Lighter teeth shades were preferred among female subjects compared to male subjects with the same skin color. In addition, lighter teeth shades were preferred among subjects with a lighter skin color and vice versa ($p < 0.05$).

Conclusion: Gender and skin color influences the perception of teeth shades among general population. Therefore, lighter tooth shades (BL1, BL2) for lighter skin color and comparatively darker

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tooth shades (BL4, B1, A1) for darker skin individuals should be prescribed as these are perceived as natural among Saudi population.

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1. Introduction

The creation of an attractive but natural dental appearance has become a critical treatment success criterion in all fields of dentistry, in particular, in prosthetic and restorative dentistry (Carlsson et al., 2008). Smile (teeth and perioral tissues) is considered an expression of utmost importance in reflecting an individual's personality (Niaz et al., 2015). It is reported that patients show a particular desire for pearly white teeth (Qualtrough and Burke, 1994; Alkhatib et al., 2004) as they are associated with high ratings of social competence, intellectual ability, psychological adjustment and relationship status (Kershaw et al., 2008). Although, shape and alignment of teeth influence the smile attractiveness; the harmony between tooth color and soft tissues is considered precarious in determining individuals' satisfaction with dental appearance (Qualtrough and Burke, 1994; Tam and Lee 2012).

The process of shade selection is a continuous challenge for dental professionals as they attempt to satisfy the esthetic requirements of patients. The perception of tooth color is subjective and influenced by many factors, including the type of light, reflection and absorption of light by the tooth, adaptation state of the observer and the context in which the tooth is viewed (Sabherwal et al., 2009). In terms of the viewing context, perceived brightness and hue of the tooth can change depending upon the brightness and color of the background respectively (Dunn et al., 1996). Sabherwal et al., studied the effect of variations in skin color on the perceptions of smile attractiveness for a given tooth shade value. They reported, that variations in skin color for most tooth shade values influenced dentists' perceived smile attractiveness (Sabherwal et al., 2009). In addition, subjects with darker skin were rated the lowest in comparison with subjects with other skin colors (Sabherwal et al., 2009). Furthermore, perceived tooth whiteness and attractiveness are influenced by the color of surrounding lips and gingiva (Reno et al., 2000). In a study by Reno et al., it was concluded that a magenta hue appeared to enhance the perceived whiteness of tooth color, whereas yellow and darker hues failed to show such impact (Reno et al., 2000). Moreover, gender is also reported to influence shade matching, and females are significantly better at shade-matching than males (Haddad et al., 2009). However the evidence related to the influence of facial outline and features among males and females and its impact on shade perception is not available. It is noteworthy that these studies (Reno et al., 2000; Sabherwal et al., 2009) were performed among dental professionals and an opinion of the general population might differ from them on the basis of dental exposure and social experiences (Nakhaei et al., 2016; Pohlen et al., 2016).

Increased participation of patients is encouraged in decision making with regards to oral health treatment including shade selection and smile design. The selection of an artificial tooth or restoration with a proper shade has shown to influence

the patient's esthetic perception positively and improve prosthesis acceptance (Bauer et al., 2012). It is hypothesized that skin color and gender of patient have no effect on the selected teeth shade in general population. Therefore, the aim of the study was to evaluate the influence of gender and skin color on the preference of different teeth shades in general population.

2. Materials and methods

2.1. Preparation of photographs

The study protocol was approved by the College of dentistry research center (CDRC). Two adult subjects [male (35 age) and female (33 age)] with an esthetic smile showing most of the maxillary and mandibular anterior teeth were recruited (with consent) for the study. One standardized frontal view smile photograph of the teeth and perioral area was made for each of the two subjects (male and female) in ambient light using digital camera (Nikon d7100, Japan, shutter speed of 1/80 s and aperture of 8.0). The camera was placed at the level of the occlusal plane, and both subjects were asked to display a normal smile.

Six different teeth shades (BL1, BL2, BL3, BL4, A1, and B1) from a commercially available shade guide [A-D shade guide © 2016 Ivoclar Vivadent Inc., USA] (Fig. 1) were utilized in the study. Shade tabs were photographed using a digital camera (Nikon d7100, Japan, shutter speed of 1/80 s and aperture of 8.0, macro USM lens) and two external flashes in a photography tent (Neewer® 60 × 60 cm/24" × 24"). Each shade tab was photographed separately before being merged using Photoshop software (Adobe Lightroom, Adobe Systems Software Ireland Ltd.). The obtained photographs of the subjects were manipulated using Photoshop (Adobe Photoshop CC 2014). For each subject's photograph, the skin was modified into one of 4 skin colors [fair type II, medium III, olive IV and brown V (Fitzpatrick scale)] (Fig. 2). For each skin color in both male and female subject pictures, the original teeth shade was modified into one of six different shades using the obtained images from the shade tabs (BL1, BL2, BL3, BL4, B1, and A1) using Photoshop software. Six to eight copies of each shade tab were made, depending upon the visible teeth in the subjects' smile. Furthermore, they were arranged according to the subjects' teeth size (central, lateral and canine). Later, the shade was adapted using the software color-matching tool. In total, there were 48 modified images for both the male and the female subjects (Figs. 3–10). Performing a pilot test validated the shades. A sample of dentists were shown random skin tones along with random teeth shades and were asked to select the correct shade shown on a tablet computer. The total number of dentists who participated in the pilot test was 15.

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