

The relationship of some patients factors with shade of their teeth measured by spectrophotometry in Turkish people

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ABSTRACT

Objective: To investigate the relationships of some patients' factors with the shade of their teeth in Turkish people.

Methodology: Four Hundred subjects who had no defects in their natural right maxillary central incisors were examined in this study. Shade of teeth was measured with a spectrophotometer. Eye colours were classified as brown, honey, hazel, green, black and blue respectively. Skin complexions were determined by using the Fitzpatrick Skin Type Classification. Tooth shades were placed into 13 categories using the vita shade scale, and skin complexion in 6 categories. The Pearson Chi-Square and Likelihood Ratio statistical tests were used to analyze the data.

Results: There was no correlation between the skin complexion and tooth shade ($P > 0.05$). Statistically significant differences were found between gender and tooth shade ($P < 0.05$). People with their ages between 14-30 and 31-45 generally had A2 tooth shade, and those who were between the ages of 46-60 and 61-80 generally had A3 tooth shade. There was a statistically significant correlation between age and tooth shade ($P < 0.05$). People having hazel, brown, blue and black eyes had A2 shade teeth and those with honey and green eyes generally had teeth with the A3 shades. There were no statistically significant correlations between eye and tooth shade ($P > 0.05$).

Conclusion: Within the limitations of this study, there were no significant relationships between skin complexion, eye color and tooth shade. Younger people generally had A2 shade teeth. Elderly people were more likely to have darker teeth.

KEY WORDS: Tooth shade, skin complexion, Eye color, Age.

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INTRODUCTION

Esthetics is an important perspective affecting the success of dental restorations.¹ In this regard, selecting a suitable tooth shade is a vital step ensuring natural appearance with dental restorations.² The shade for dental restorations is selected in two

ways either with the help of conventional shade guides in conjunction with the naked eye³ or using special systems such as the spectrophotometer or colorimeter.⁴ The use of shade guide and naked eye for matching and deciding the colour of dental restorations and prostheses is the clinical method that is widely used today. The disadvantage of this method however, is that the clinical judgment is influenced by the skill of the practitioner involved. Thus there is always a chance of error in making appropriate selection. Furthermore, the shade of teeth in the mouth changes depending on the person, the environment, and the state of the tooth.⁴ Thus the use of devices, such as a spectrophotometer and colorimeter, is these days gaining more popularity. Selecting tooth shade with these devices is faster and more objective than using the conventional shade guides and the

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Fig.1: Eyes colors.



Fig.3: Spectrophotometer.

human eye. With these devices, lighting conditions and environmental factors have no effect on color selection.⁴ These devices simulate the receptors in the eye.³ Spectrophotometers evaluate a wider wavelength of light using colorimeters and can measure differences among all the colors our eyes can detect.¹ Modern spectrophotometers provides measurements according to the Vita CIE Lab color scale as well as they can assess the measurements according to the Vita colour scales. In addition, their use is considered easy by the dental practitioners and technicians. The Vita-Lumin shade guide for choosing shade of teeth is routinely used in Turkey.

There is no shade selection system for edentulous patients. Shade selection for artificial teeth becomes a subjective process.⁵ Dentists either choose shade for denture teeth with their clinical experience, shade guides or patients choose shade from the tabs of teeth in a shade guide. In these situations skin, eye, gender or age are taken as guides that could help dentist while choosing shade for denture teeth in edentulous patients.⁶ A study showed a relationship between tooth and skin color with a negative correlation between the brightness of teeth and skin color.⁷ This would thus require that all skin colors

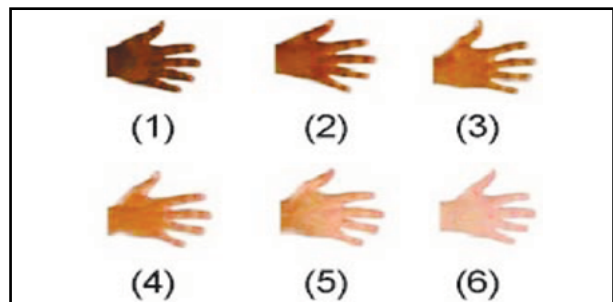


Fig.2: Fitzpatrick Skin Type classification.



Fig.4: Protection barrier.

and skin types of people all over the world need to be classified in the same system to allow one to evaluate the applications scientifically. There is a lack of literature with regard to standard shade guides used for skin tones for use specifically in a dental practice. Therefore, International Classification for skin colour might be used to establish the types of human.⁸ This system divides human skin into six types with clear white skin tone as type 1 and the darkest (dark-brown- black) skin as type 6. In between these two extremes, are the wheat skin (type 2), darker than white skin (type 3), light brown skin (type 4) and the brown skin (type 5).

There are a few studies explaining the relationship between shade of teeth and skin colour. Furthermore, studies of the kind had recruited

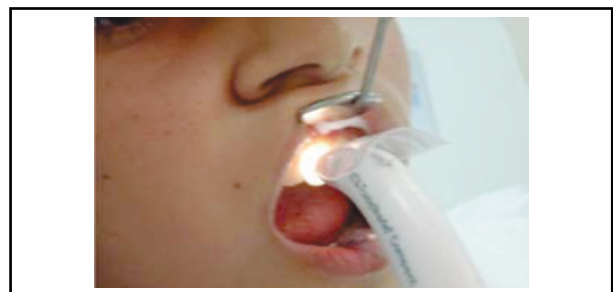


Fig.5: Color measurement.

Table-I: Cross tabulation of gender and tooth shade.

	A1	A2	A3	A3,5	A3.5	A4	B1	B2	B3	B4	C1	C2	C3	C4
Female	10	63	44	0	8	0	20	38	18	5	2	3	3	0
Male	4	54	39	2	17	8	10	20	14	6	3	3	4	2
Total	14	117	83	2	25	8	30	58	32	11	5	6	7	2

Chi-Square test $P=0.013$.

Table-II: Cross tabulation of skin and tooth shade.

Skin color	A1	A2	A3	A3,5	A3.5	A4	B1	B2	B3	B4	C1	C2	C3	C4
White	0	20	17	0	5	1	3	15	7	0	2	1	2	0
Wheat	2	1	2	0	0	0	0	1	0	1	0	0	0	0
Darker than white	4	26	19	1	0	0	10	12	8	3	0	1	2	0
Light brown	6	45	35	1	17	6	15	21	12	6	3	3	2	1
Brown	2	25	9	0	3	1	2	9	5	1	0	1	1	1
Dark	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Total	14	117	83	2	25	8	30	58	32	11	5	6	7	2

Chi-Square test $P > 0.05$.

no more than 100 participants, and that no study investigating the relationships between eye color and tooth color is so far available. The purpose of this study was to investigate the color distribution of teeth to determine the correlation of the tooth shade with skin color, eye color and age in patients visiting the Mustafa Kemal University, Faculty of Dentistry (Turkey). The null hypothesis was that there was a correlation among tooth shade and skin color, eye color and age.

METHODOLOGY

This study was conducted by examining the shades of maxillary right central incisors having no enamel defects, caries or restorations of 400 subjects (age range 14 – 80 Years) at Mustafa Kemal University, Faculty of Dentistry. The study was approved by the university research ethics committee (REC) with reference No: B.30.2.MKU.0.01.01.00/3143/33-34). Eye colours were classified as brown, honey, hazel, green, black and blue respectively (Fig.1). The patient's skin complexions were determined using the Fitzpatrick Skin Type Classification (Fig.2). Skin shade determinations were acquired from the hands of the patients so that the area was free of makeup or residues.

The patients' teeth were polished with pumice and water mixture before their shade was determined. The patients' skin colours were determined by the same person in the dental clinic. Teeth color measurement was made using a spectrophotometer shown in Fig.3 (Easysshade 1, Software version: 11 R(b), illuminant D65, 2° observer, Vita Zahnfabrik, Bad-Sackingen, Germany). A new cross-infection control barrier (Fig.4) was ensured for every new patient. The patient was seated in the appropriate position and teeth were dried with a dental air-water spray and isolated from saliva and surrounding tissues with a cotton pad. The spectrophotometer was positioned to observe the buccal central surface of the central incisor (Fig.5). The measurements and assessments were made using the Vita shade scale. The color measurements were made twice and mean values of them were recorded. Spectrophotometer's calibration was made by placing a probe

tip on the calibration port aperture before each color measurement.

Statistical Analysis: Data collected were statistically analyzed using Pearson Chi-Square and Likelihood Ratio statistical analyses ($\alpha = 0.05$).

RESULTS

Table-I shows the cross tabulation of gender and tooth color. Two hundred fourteen women patients were examined for tooth color. A2 (15.8%) shade was the most prevailing as compared to A4 and C4 shade non existing.. The data in Table-I show that in men (N=186), A2 shade was the most frequent (13.5%) and C4 as the least (0.5). Statistically significant differences were found between gender and tooth shade ($P < 0.05$). A2 was the most frequent shade (29.3%), C4 as the least frequent shade (0.5%) among the 400 patients (Table-I).

Table-II shows the cross tabulation of skin colours and tooth shades. White (27.4%), darker than white (41.7%), light brown (26%) and brown (30.2%) skinned persons generally had A2 tooth shade. Subjects having wheat-coloured skin (66.7%) and dark skinned persons generally had A3 tooth shade (Table-II) There was no correlation between skin colour and tooth shade ($P > 0.05$).

Table-III shows data for the cross tabulation of eye colours and tooth shades. People who had hazel, brown, blue and black eyes generally had teeth with A2 shade and honey and green eyed subjects generally had A3 shades (Table-III). There were no statistically significant differences between eye colour and tooth shade ($P > 0.05$).

Table-IV shows the cross tabulation of data for the age groups and tooth shades. People who had their ages ranging between 14-30 and 31-45 years, generally had A2 tooth shade and those between 46-60 and 61-80 years, generally had A3 shade teeth (Table-IV). A statistically significant correlation between age and tooth shade was seen ($P < 0.05$).

DISCUSSION

The data obtained in this study were in support of partial rejection of the null hypothesis. This was because the tooth shade was found statistically dif-

Table-III: Crosstabulation of Eye and Tooth shade.

	A1	A2	A3	A3,5	A3.5	A4	B1	B2	B3	B4	C1	C2	C3	C4
Honey	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Hazel	1	19	18	0	4	3	6	11	11	3	2	2	4	1
Brown	7	68	43	2	11	3	18	31	15	5	3	2	2	0
Blue	2	4	1	0	1	0	0	1	0	0	0	0	0	1
Black	3	22	15	0	8	1	5	11	3	1	0	1	1	0
Green	1	4	4	0	1	1	1	4	3	2	0	1	0	0
Total	14	117	83	2	25	8	30	58	32	11	5	6	7	2

Chi-Square test $P > 0.05$

Table-IV: Crosstabulation of Age Groups and Tooth shade.

	A1	A2	A3	A3,5	A3.5	A4	B1	B2	B3	B4	C1	C2	C3	C4
14-30	9	64	18	1	2	1	16	23	8	5	2	0	1	0
31-45	5	43	42	1	10	2	12	26	18	4	2	6	3	1
46-60	0	8	20	0	13	4	2	8	6	2	1	0	3	1
61-80	0	2	3	0	0	1	0	1	0	0	0	0	0	0
Total	14	117	83	2	25	8	30	58	32	11	5	6	7	2

Chi-Square test $P < 0.001$

ferent from skin and eye color on the other hand it is statistically significant correlation between age and tooth shade.

Since dentists have begun using colorimeters, research on these systems for choosing tooth color and discovering whether there is a relationship between tooth and skin color has revealed very different results.^{7,9} In the present study, the spectrophotometer was used because it yields reliable results via the use of the classical scales. One study of the relationship between the brightness of tooth and skin color discovered an inversely proportional relationship. Dark-skinned people have brighter teeth than white-skinned people. Jahangiri and colleagues studied 119 patients and investigated relationships between tooth color and skin color.

The color of teeth becomes darker as people age, but elderly dark-skinned people still have brighter teeth than elderly white people.⁷ Paul and colleagues compared color selections made by the naked eye and spectrophotometers. In their study, 10 cases were evaluated by three clinicians who made color selections using a shade guide and the spectrophotometer. Nine out of ten patients had crowns with color shades measured by spectrophotometer.⁹ According to a study by Paravina, shade detection must be made under daylight to make the best selection.¹⁰ In addition, a similar study evaluated the Shade Eye-Ex Dental Chroma Meter Dental Eye (shade guide device) and found its results comparable to the results obtained with conventional shade guide and human eye.¹¹ This study was done using the spectrophotometer under daylight conditions.

CONCLUSION

No conformity between the shade of teeth and the skin and eye colors of a subject was found in

this study. A2 was the most common tooth shade in both the young men and women. There was a correlation between age and tooth shade. Darker shade teeth were seen in older people. Including different race groups in the future studies may provide further clarification about the relationship of patients' factors as guidelines for use when selecting shades of teeth.

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