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Original article

The correlation between the value of tooth color and skin color in Torajans[☆]

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ABSTRACT

Objective: The aim of this study was to determine the correlation between the value of tooth color and skin color in Torajans.

Methods: This study was an analytical observational study with a cross-sectional design. This study was conducted in Balusu subdistrict and Saddan subdistrict, Toraja Regency in 2008, using purposive sampling technique based on sex, age, and education characteristics. The sample consisted of 73 torajans, age 15–60 years old, had intact maxillary central incisors, no stains, no calculus, and dental plaque. Data were analyzed with computerized statistical test.

Results: This study found that there was a correlation between the value of tooth color and gender in Torajans ($p < 0.05$), there was no correlation between the value of tooth color and age group in Torajans ($p > 0.05$), and there was no correlation between the value of tooth color and skin color ($p > 0.05$).

Conclusion: There was no correlation between the value of teeth color and skin color in Torajans.

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Introduction

Esthetic factor is very influential on the satisfaction of a patient who wears a denture. One of the things that affect the esthetic of a denture is the color selection of the denture. The major three characteristics of color include hue, chroma, and value.¹ Hue is a quality that distinguishes one color from another and called a primary color or a combination of several colors. Chroma is the level of saturation, intensity, or strength of hue. Value or brightness is a relative amount of bright or dark. Value is the most crucial characteristic in measuring the color.²

Several factors such as age, sex, and skin color are helpful in artificial teeth color selection as some of these methods are related to esthetic factor evaluation.³ In the dentistry, the esthetic factor is essential as the patients keen to get satisfaction in their oral treatment. Tooth color is one factor that can influence the esthetic factor.⁴

The skin color of each person is not always the same, as there are several determinant factors for skin color, including internal and external factors. The internal factor consists of race, hereditary,

and genetics. In contrast, external factor consists of lifestyle (how often exposed to UV, smoking, consumption of particular antibiotic with minocycline as an active agent) and skin treatment, as well as consistency of safe and effective cosmetic products use.¹

Information on the correlation between tooth color and skin color is still limited. This lack of knowledge has an impact on the ability of a prosthodontist to choose artificial teeth that are harmonious with the complex face shape of the patient. However, within the limitations of the study, the value of teeth color and skin color are found to be related.⁵

A perception among prosthodontics and restorative dentists explains that a person with darker skin has a brighter shade of teeth. However, this does not always occur because of extrinsic and intrinsic factors that affect skin color and tooth color.⁶ Two factors that affect artificial tooth color selection include clinic room environment and patient condition. In a clinic room environment, green or light blue is perfect for tooth color selection, patient clothes should be covered with blue cloth and lipstick should be cleaned off as striking color leads to inaccurate color selection. Sunlight is the best lightning source, as it is natural light and practically does not affect the color selection.⁷

Toraja, as one of the regencies in South Sulawesi Province, is well known as a tourism destination. The populations in Toraja have diversity in terms of skin color, ranging from black, brown, and white. Hence, it is essential to find out the value of Torajans skin color and tooth color.

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Methods

This study was an observational analytical study with a cross-sectional approach. This study was conducted in Balusu and Saddam subdistricts, Toraja regency. These locations were chosen as research sites because most of the populations are native Toraja. This research was conducted in May 2008, using purposive sampling technique, which was based on the subject with several particular characteristics, including sex, age, education. Hence, the analysis could be valid.

There were 73 torajans participated in this study as a sample. Sample criteria were two previous parental generations were native (not mixed with other races/tribes), aged 15–60 years both for female and male, still have intact maxillary central incisors with no caries and restoration, do not have stain, calculus, and plaque on maxillary central incisors; if do, scaling must be performed manually.

A selection was made of the population that met the criteria and was determined as the study sample. Furthermore, a notification was given to the local sub-district head in the form of research permission in the area. Interviews were conducted with respondents using questionnaires by visiting the respondents home directly. Before conducting the inspection, informed consent was given to the respondent. Scaling of the oral cavity was done using manual scaling, cotton, 70% alcohol, and povidone-iodine.

Teeth color value assessment was performed using Vita Lumin Shade Guide on maxillary central incisors after the teeth had been cleaned. The measurement of skin color value using the Garnier skin test on the patient's face.

The data obtained are presented in table form and analyzed statistically with p -value 0.05.

Results

Based on the data collected from Toraja population with total sample 73 people from various backgrounds, the distribution of respondents according to teeth value was distributed to the highest value of 36 people (49.3%), while the lowest was at high value of 15 people (20.5%). This can be seen in Table 1. Also, it appears

Table 1
Respondents teeth value distribution, Saddam Balusu subdistricts, Tana Toraja Regency.

Value	Number (n)	Percentage (%)	Total
Teeth			
Highest (A1, B1, A2, B2)	36	49.3	73 (100%)
High (C1, D2, A3, D4)	15	20.6	
Medium (B3, B4, C2, D3)	22	30.1	
Low (A3, 5, C3, A4, C4)	0	0	
Skin			
White (1, 2, 3, 4)	0	0	73 (100%)
White/medium (5, 6, 7, 8)	3	4.1	
Medium (9, 10, 11, 12)	21	28.8	
Dark (13, 14, 15, 16)	49	67.1	

that the value distribution of respondent's skin is mostly in dark skin color, which is 49 people (67.1%), while the least is the white/medium color which is 3 people (4.1%).

Table 2 illustrates the correlation between gender and respondents teeth value, which the highest value dominating the result (color A1, B1, A2, B2) with female, accounted for 28 people (77.8%); meanwhile, the least is found in high value (color C1, D2, A3, D4) with male, accounted for 7 people (46.7%).

Correlation between age and teeth values of respondents as shown in Table 3, is dominated by the highest value (color A1, B1, A2, B2) with 24–32 years age group, accounting for 9 (25%); meanwhile the least is at high value (color C1, D2, A3, D4) and medium value (color B3, B4, C2, D3) with 15–23 years age group, for 1 person.

Table 4 illustrates the correlation between skin value and respondents teeth value, which the dark skin value dominating the result (13, 14, 15, 16) and the highest teeth (A1, B1, A2, B2), accounted for 21 people (58.3%); meanwhile, the least is found in white skin value (1, 2, 3, 4), accounted for 0% and medium tooth value (B3, B4, C2, D3) for 1 person (4.5%).

Discussion

The results of the analysis (Table 2) found a correlation between the value of tooth color and gender in the Toraja tribe ($p=0.03$). This

Table 2
Gender correlation with respondents teeth value, Saddam Balusu subdistricts, Tana Toraja Regency.

Gender	Teeth value						Total	
	Highest (A1, B1, A2, B2)		High (C1, D2, A3, D4)		Medium (B3, B4, C2, D3)		n	%
	n	%	n	%	n	%		
Male	8	22.2	7	46.7	12	54.5	27	37
Female	28	77.8	8	53.3	10	45.5	46	63
Total	36	100	15	100	22	100	73	100

$p=0.030$ chi-square test.

Table 3
Correlation between age group and teeth values of Torajans, Saddam Balusu subdistricts, Tana Toraja Regency.

Age groups (years)	Teeth value						Total	
	Highest (A1, B1, A2, B2)		High (C1, D2, A3, D4)		Medium (B3, B4, C2, D3)		n	%
	n	%	n	%	n	%		
15–23	7	19.4	1	6.7	1	4.5	9	12.3
24–32	9	25	2	13.3	2	9.1	13	17.8
33–41	5	13.9	5	33.3	5	22.7	15	20.5
42–50	8	22.2	5	33.3	6	27.3	19	26
51–59	2	5.6	2	13.3	6	27.3	10	13.7
>60	5	13.9	0	0	2	9.1	7	9.6
Total	36	100	15	100	22	100	73	100

$p=0.03$ chi-square.

Table 4
Correlation between skin value and teeth value of Torajans, Sattan Balusus subdistricts, Tana Toraja Regency.

Skin value	Teeth value						Total	
	Highest (A1, B1, A2, B2)		High (C1, D2, A3, D4)		Medium (B3, B4, C2, D3)		n	%
	n	%	n	%	n	%		
White (1, 2, 3, 4)	0	0	0	0	0	0	0	0
White/medium (5, 6, 7, 8)	2	5.6	0	0	1	4.5	3	4.1
Medium (9, 10, 11, 12)	13	36.1	5	33.3	3	13.6	21	28.8
Dark (13, 14, 15, 16)	21	58.3	10	66.7	18	81.8	49	67.1
Total	36	100	15	100	22	100	73	100

$p = 0.103$, chi-square test.

result is not in line with Zhou's results in the African population, which states that there is no significant relationship between gender and tooth color.^{1,8,9} This result may be due to internal factors such as race and descent that differ between Toraja population and African population.

Lombardi (quoted by Ascheim et al.) describes an anterior esthetic theory which states that age and gender only relate to the shape of the teeth. Women have more rounded teeth, translucent incisal edges, defined incisal embrasures and smoother surfaces, whereas men have more angled and uneven teeth, incisal embrasure looks boxier that makes the teeth look not real. The shape of the teeth usually changes with age. In the elderly, the incisal edge has experienced attrition and wear due to prolonged use, and the tooth tubercle has also been lost. The length of the clinical crown also appears to increase in length.¹⁰

In this study, the standard age of 15–60 was used because at the age of 15 years, the anterior maxillary teeth were generally perfectly erupted and secondary dentin was formed. Whereas at the age of ≤ 60 years oral hygiene is still well maintained so that the degree of loss of anterior teeth is relatively low, especially the maxillary incisors. The results of the frequency relationship for age groups and dental values showed that elderly patients seemed to have lower teeth value compared to young age. Based on the data analysis, the value of $p = 0.103$ indicates that there is no relationship between the value of teeth and the age group of the Toraja tribe (Table 3). This is due to physiological discoloration of the teeth can occur with age as dentin becomes thicker. Secondary dentin deposition and reparative dentin can cause discoloration of the teeth, and also the pulp chamber decreases due to the accumulation of secondary dentin in it. This makes the teeth more opaque and reduces the effect of pulp color.^{1,11}

Table 4 indicated that there is no correlation between the value of tooth color and the value of the skin color of the Toraja tribe. The results of this study also support the statement of N'Guessan et al. (cited by Essan et al.) who found an inverse correlation between the value of tooth color and skin color.¹ A study conducted by Jahangiri et al. also suggested that someone with moderate to dark skin has teeth with a higher value (brighter), whereas someone with whiter skin tends to have lower value teeth (darker), regardless of age and gender.^{5,12}

In this study, someone who has the highest value (brighter) to a lower value seems to have a dark skin color. This is because the people of the Sattan and Balusu sub-districts work as farmers that cause them to be often exposed to UV light and other external factors, such as the use of modern and traditional cosmetics that are less attractive to the community, so the skin color becomes rather dark.

Based on the result of this study, it is concluded that the value of the tooth color of the Toraja tribe was mostly distributed to the highest value (colors A1, B1, A2, B2), while the value of skin color was mostly distributed to skin color dark (13, 14, 15, 16). Besides, the value of women's teeth was higher than men. The correlation of the age group with the value of the teeth of the Toraja people is highly distributed in the highest value (color A1, B1, A2, B2) with the age group 24–32 years. The correlation between the teeth and skin value of the Toraja tribe was found mostly in the dark skin (13, 14, 15, 16), while the least was in the value of medium teeth (colors B3, B4, C2, D3).

Conclusion

From the result of this study, we concluded that there was no correlation between the value of teeth color and skin color in Torajans.

Conflict of interest

The authors declare no conflict of interest.

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