

Accuracy in Identification of Shade by Dental Practitioners for Restorative Purpose: A Cross Sectional Study

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ABSTRACT

Background: The objective of the study was to check the accuracy in shade selection by dental practitioners.

Materials and Methods: The cross-sectional study was conducted. It included a total of 100 dental practitioners whose experience ranged from 0-20 yrs. Images of each shade group were shown to each participant.

Result: Maximum accuracy was found in A1 and B2.

Conclusion: There is no relation in the accuracy of shade selection with an increase in the year of clinical experience.

Keywords: Shade selection, shade matching, tooth colour matching.

INTRODUCTION

The success of the restorative dentistry depends upon the colour matching of the restoration with the natural tooth. This is a very important and challenging step. Matching of the restoration with the adjacent tooth structure will determine the esthetic outcome¹. Color matching is routinely done by the help of shade guides. A clinically acceptable result need proper evaluation and analysis of the color distribution in the shade. Shade guides are most commonly used armamentarium in our routine practice, but still, it has some limitations². 100% match with the tooth is not possible as there is a difference in material and structure of shade guide tabs and tooth³. There may be variation in the

ability of different practitioners to detect small differences in colour⁴⁻⁶. Sometimes despite the same colour perception, there may be a difference in opinion⁷. Despite these limitations, shade guides are still the main method of shade selection in our daily dental practice. Therefore, our study is concentrated to determine the amount of variation in recognition of different shades by different dental practitioners of different working experience.

MATERIALS AND METHODS

Total of 100 participants were selected. Based on their experience, they were divided into four categories.

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Table 1: Subject demographics

GROUP	SUB JECTS	TOTAL NUMBER
A	experience between 0-5yrs	25
B	experience between 5-10yrs	25
C	experience between 10-15yrs	25
D	experience between 15-20yrs	25

Each participant was asked to match the shade of seven electronic images with the physical Vita classical shade guide.

RESULT

Table 2: The Cross-Sectional study was conducted on 100 participants. The results are as follow:-

Shade	Accuracy in Group A	Accuracy in Group B	Accuracy in Group C	Accuracy in Group D
B2	72%	40%	36%	16%
B3	20%	12%	16%	16%
B4	16%	24%	20%	32%
A2	4%	4%	8%	8%
A1	48%	52%	56%	20%
C3	12%	20%	24%	56%
D4	20%	12%	8%	12%

Table 3: Accuracy of each shade

Shade shown	Overall accuracy in shade matching	Percentage
B2	41	41 %
B3	16	16%
B4	23	23%
A2	6	6%
A1	44	44%
C3	28	28%
D4	13	13%

Overall accuracy

Out of the total collected data, only 171 participants accurately matched the shade. The overall accuracy of the study was 24.4%.

DISCUSSION

Munsell colour order system is used to describe any colour based on its Hue, Value and Chroma. For shade selection, we use to determine Value first and then followed by Chroma and Hue⁸.

Munsell colour order system

Munsell colour order systems are most commonly used and worldwide accepted system for colour determination.

1 HUE

Hue, is basically determined by the wavelength of the reflected radiation from the object. It distinguishes different family of colours.

2 VALUE

Value is described as a white to- black greyscale. High-value objects have smaller amounts of

grayscale and will appear brighter. The brightness can be increased by lighter porcelain or by increasing the surface reflectivity.

3.1.3 CHROMA

Chroma shows saturation of the hue. The Value decreases with the increase in Chroma.

Based on hue, four different shades family are selected in Vita shade guide namely: - A, B, C and D. These are further grouped by increasing Chroma and decreasing value, arranged in numerical order. Group A is reddish-brown, group B is reddish-yellow, group C is grey, and group D is reddish-gray⁹⁻¹¹.

The proper interpretation of colour is helpful in lab communication work also. In the present study, we have chosen the Vita shade guide as it is most commonly used by dental practitioners. For differentiation of hue we have chosen member from all four families in Vita shade guide namely; A, B, C and D. For Value and Chroma we have selected member from group A and group B. This way total seven shade identified for practitioners. 7 shades for each participant were chosen. Thus a total of 700 samples were selected. Out of these 700 samples, only 171 shaded were identified correctly. A1 and B2 were the colours which gave an accuracy of more than 40%. However, some variation from practitioner to practitioner is unavoidable. No, any correlation found inaccuracy of shade selection based on their year of experience.

CONCLUSION

Variation in identification and interpretation of different shades are found. However, maximum accuracy in shade A1 and B2 was observed, but still, its percentage is not very convincing. No any relation in increasing the accuracy of shade selection was found with an increase in the year of experience.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

REFERENCES

1. Tung FF, Goldstein GR, Jang S, Hittelman E. The repeatability of an intraoral dental colorimeter. *J Prosthet Dent* 2002;88:585-90.
2. Goodkind RJ, Loupe MJ. Teaching of color in predoctoral and postdoctoral dental education in 1988. *J Prosthet Dent* 1992;67:713-7
3. Preston JD. Current status of shade selection and color matching. *Quintessence Int* 1985;16:47-58.
4. Brown WRJ. Color discrimination of twelve observers. *J Opt Soc Am.* 1957;47 (2):137-143.
5. Wyszecki G, Fielder GH. Color-difference matches. *J Opt Soc Am.* 1971;61(11):1501-1513.
6. Culpepper WD. A comparative study of shade-matching procedures. *J Prosthet Dent.* 1970;24(2):166-173.
7. Johnston WM, Kao EC. Assessment of appearance match by visual observation and clinical colorimetry. *J Dent Res.* 1989;68(5):819-822.
8. Powers JM, Sakaguchi RL. Restorative dental materials. 12th ed. St. Louis: Mosby; 2006. p. 28-31.
9. Schwabacher WB, Goodkind RJ. Threedimensional color coordinates of natural teeth compared with three shade guides. *J Prosthet Dent* 1990;64:425-31.
10. Chu SJ. Fundamentals of Color: Shade Matching and Communication in Esthetic Dentistry. Quintessence Publishing Co. Inc 2004.
11. Ahn JS, Lee YK. Color distribution of a shade guide in the value, Chroma, and hue scale. *J Prosthet Dent* 2010;100:18-28.