Shade Matching By Dental Graduates: An Original Research.

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Abstract:
Introduction: The aim of esthetics in dentistry is to provide life in prosthesis and to help patient for being acceptable in society. Various clinicians have their own methods of assuming shades. Some assume by arranging shade tabs by the lightness or darkness of the colour. The present study was undertaken with the aim of evaluating the knowledge of dental graduates in shade selection of teeth and to find out the shade most commonly mismatched.
Materials & method: 25 dental students participated in the study. A shade tab of vita classical was taken and markings were covered with the help of tape. Another vita classical shade guide was taken and used as control. Each student was subjected to 10 unmarked shade tabs separately for shade selection against the Vita shade guide classical which was used as control and asked to correctly identify the shade. An A4 sheet of gray card was used to rest the subject's eyes between shade assessments.
Results:P Out of 250 readings, 185 readings were found to be correct, 54 readings were found to be incorrect and remaining 11 cases were failure to identify the shades. In respect to A2, 20 readings out of 25 were found to be correct, in relation to A3, 18 were found to be correct, In A3.5-14 readings, In B1- 23 cases, In B2- 18 cases, In B3- 13 cases, In C1- 17 cases, In C2- 15 cases, In C3- 21 cases and in D2- 14 cases respectively. A significant difference does exist between the shades when tested for significance at the level of 0.001.
Conclusion: The results of the present study suggest that Hue is the most difficult factor assessed by dental graduates. B1 was most correctly matched and maximum difficulty was in identification of B3, A3.5 and D2, all three being identical.
Keywords: Esthetic, Hue, Shades, Vita.

I. Introduction

The study of colour is an integral part of esthetic dentistry. Dentistry aims to restore form, function and esthetics of the individual to normal or above normal state. The increased expectations of the patient have led us to be more vigilant for the colour and shape of prosthesis. Dentistry is a science that besides providing basic health care facility has to be artistic and provide life to the artificial substitutes.[1] A slight alteration or change in colour can lead to unacceptability by the patient leading to failure of the restorations To achieve esthetics, four basic determinants are required in sequence; viz., position, contour, texture and color.[2] Esthetic dentistry imposes several demands on the artistic abilities of the dentist and the technician, knowledge of the underlying scientific principles of color is essential. Colour or shade selection is not a step in prosthesis fabrication but a complete science in itself. Colour was just a mystery before Isaac Newton[3] differentiated light in seven wavelengths each having its own importance. The increased interest of dentists in the field of colour science helped in usage of various manual and automated shade systems. Shades can be checked by two systems: Visual and quantitative. Quantitative systems are there in market but are costly to be used in routine practice limiting their use only in research activities. Visual system or commonly called as munsell system is the main system used in clinics. The system consists of hue determining the basic colour, value determining the darkness or lightness of colour and value determining intensity of the colour.[4] Various commercial brands like Vita pan, Vita 3d master, Ivoclar shade guide are there in market and are used in routine practice but needs a lot of experience and skill to determine the correct shade. The aim of the present study is to analyze the shade matching capacity in dental students of Jammu.

II.   Materials & method

The present study was undertaken in dental college Jammu. 25 dental students participated in the study consisting of 17 boys and 8 girls under the supervision of senior prosthodontist. The study was conducted on 25 dental students and oral consent was taken by the students. The study was carried out in a room with ample sunlight. A shade tab of vita classical was taken and markings were covered with the help of tape. Another vita classical shade guide was taken and used as control. Each student was subjected to 10 unmarked shade tabs separately for shade selection against the Vita shade guide classical which was used as control and asked to correctly identify the shade. Each student was allocated 1 minute for each shade selection. An A4 sheet of gray card was used to rest the subject's eyes between shade assessments. Examiners were asked to look at it for 15 seconds to avoid color fatigue. Each shade tab was kept at an arm's length. Similar proceedings were carried out for all the 25 dental students. Data recorded was tabulated and analyzed statistically.

III.   Results

The data collected for each patient was analyzed and mean values for shade was selected. Out of 250 readings, 185 readings were found to be correct, 54 readings were found to be incorrect and remaining 11 cases were failure to identify the shades. In respect to A2, 20 readings out of 25 were found to be correct, in relation to A3, 18 were found to be correct, In A3.5-14 readings, In B1- 23 cases, In B2- 18 cases, In B3- 13 cases, In C1- 17 cases, In C2- 15 cases, In C3- 21 cases and in D2- 14 cases respectively. A significant difference does exist between the shades when tested for significance at the level of 0.001.

Sno.	Shade	Total readings	Correct readings	Percentage
1.	A2	25	20	80%
2.	A3	25	18	72
3.	A3.5	25	14	56
4.	B1	25	23	92
5.	B2	25	18	72
6.	B3	25	13	52
7.	C1	25	17	68
8.	C2	25	15	60
9.	C3	25	21	84
10.	D2	25	14	56

IV.   Discussion

Shade matching is an important part in all restorative and prosthodontic treatments. Appearance of the patient is one of the major factors influencing success or failure of the treatment rendered. Various ratios, phi's and proportions like golden or red proportions are there in market only with the purpose of achieving predictable esthetics.[5,6] The aim of esthetics in dentistry is to provide life in prosthesis and to help patient for being acceptable in society. Various clinicians have their own methods of assuming shades. Some assume by arranging shade tabs by the lightness or darkness of the colour: B1 being the lightest followed by A1, B2, D2, A2, C1, C2, D4, A3, D3, B3, A3, A3.5, B4, C3, A4 and C4.[7] Some use the primary colour as first criterion: A1-A4 being the reddish brown, B1-B4 being reddish yellow, C1-C4 being grayish and D2-D4 being reddish grey.[8] Many times, the shade selected in the clinic turns to be entirely different on next appointment, either due to negligence of operating dentist or mis-communication of the lab and dentist. Success in shade selection is dependent upon accurate communication between the clinician and the dental laboratory technician. Factors such as coloration, staining, blending, and subtle morphological variations can be intelligently discussed only if both participants understand the language of color and the significance of hue, chroma, and value.[9] The present study was undertaken with the aim of evaluating the knowledge of dental graduates in shade selection of teeth and to find out the shade most commonly errored. The study primarily was carried out on 25 dental students separately only with the aim of avoiding any bias in the result. Vita Classical shade guide was used in the study as this is the most common and economical shade guide used in routine practice. Visual method was used in this study as previous studies by studies[6,10] indicate that shade matching instruments are more accurate, evidence to the contrary is also available.[08,11,12] A recent study by Hugo et al[13] demonstrated that human examiners showed a significantly higher agreement value when compared with computer‑aided tooth shade determination device. The devices reached on average only a value of 28.6%. Ratzmann et al[14] showed that validity was better for visual than for electronic color assessment.

An A4 sheet of gray card was used to rest the subject's eyes between shade assessments to avoid color fatigue. A senior prosthodontist was included in the study to guide students for methods of shade matching and to clear any query of dental students included in the study. Entire study was carried out in same room to avoid any inclusion of sunlight as factor in the study. The B1 colour was most commonly identified by the students, followed by C3, A2, A3, B2, C1, C2, D2, A3.5 and B3 respectively. B1 was most commonly identified due to the lightest and whitest of all the tested specimens. Maximum confusion reported by dental graduates was in B3,

A3.5 and D2; all three being identical. The results of the present study are in accordance to the study by Winkler et al[15] which concludes that dental students have more confusion in identification of darker shades. The results of the present study also suggest giving importance to the shade matching exercise in dental curriculum. This study also suggests that dental graduates have maximum difficulty in identification of hue groups. Preston and Bergen[16] recommend that students begin shade selection with a value (brightness) comparison. It should be noted whether the shade-guide tooth is higher or lower in value. The hue should be determined next. Natural teeth lie within the range of yellow-red to yellow. The last determination should be the relative saturation (chroma) of the pair being considered. Future studies should be directed in in-vivo conditions and using large sample size.

V.   Conclusion

The results of the present study suggest that hue is the most difficult factor assessed by dental graduates. B1 was most correctly matched and maximum difficulty was in identification of B3, A3.5 and D2, all three being identical.

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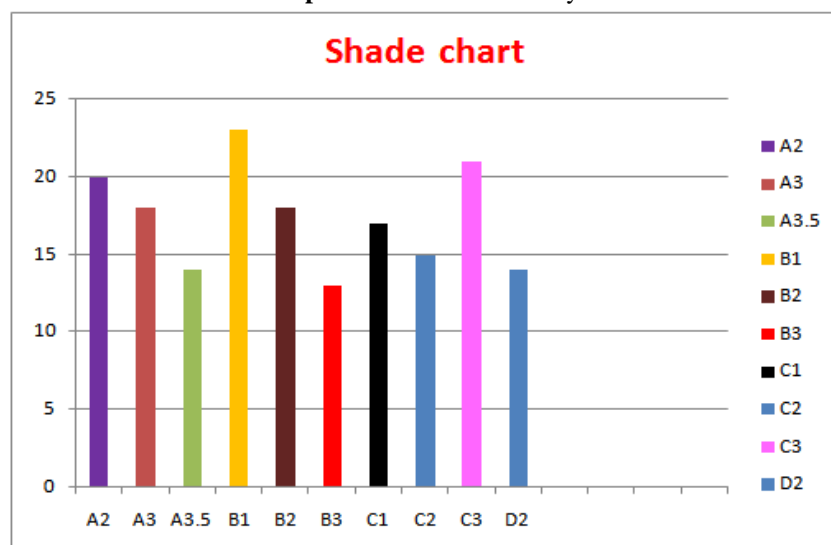
Graph 1: Results of the study.

Figure 1: Shade guide used.