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Occurrence of most common shade for crown fabrication in anteriors and posteriors in south Indian population - A retrospective study

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ABSTRACT

Shade selection is a very important part of the treatment as it dictates the final outcomes of treatment and patient satisfaction. The most prevalent shade used in dentistry is A2/B2 shade for crown fabrication. This study was conducted on the south Indian population of the Saveetha dental college university where out of 617 patients were analysed so that the shade choices used in crown fabrication is assessed. This university based study involved the collection of data from the database from which cases of crown fabrication shade were selected and cross verified. All the data was compiled and tabulated in Microsoft Excel and exported to IBM SPSS 20. Data was represented through frequency distribution tables and Chi square tests. The highest frequency of shade used for crown fabrication amongst the South Indian population was A2 in males and females, the second most commonly used shade was A1 in females and A3 in males. Within the limitation of this study, it was found that the most common shade for crown fabrication used in the south Indian population was A2 shade, followed by A3 shade in males and A1 shade in females. The least commonly used shade was A4. The maximum cases which had a requirement of crown fabrication with esthetically pleasing shade were under the age group of 21 - 30 yrs.



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INTRODUCTION

Esthetic plays a very important role in understanding and deciding the final treatment outcome of the root canal treatment followed by crown fabrication (Ravinthar and Jayalakshmi, 2018). If shade matching is done incorrectly, it causes loss of operators and patient resources and causes the

loss of time invested during the procedure. Most shade matching during crown fabrication fails due to improper communication between the operators and the lab, which causes patient as well as operator dissatisfaction, further prolonging the treatment time and loss of resources (Ravinthar and Jayalakshmi, 2018).

The modern colour matching has higher levels of accuracy depends on the CIE.L*a*b formulation (Lee, 2005). However, this system is not widely accepted. The widely accepted colour based system for proper shade selection is based on the RGB colour system (Janani et al., 2020) and based on its impetus, the Vita classical shade guide was formulated. Initially, the Vita classical shade guide was used only for ceramic (Nasim et al., 2018) based crowns but in modern times due to ease of use of the Vita classical shade guide, it has become the most accepted system to communicate colour to the dental laboratory

so that esthetically pleasing crowns are fabricated.

MATERIALS AND METHODS

The study was a university kind of study setting. The study was approved by the Research Ethics Committee of Saveetha Dental College, Saveetha University. The selection of cases was done, the cases were differentiated according to the shade selected for the crown fabrication. After this analysis was done on gender count of such cases ([Rajakeerthi and Nivedhitha, 2019](#)) and the data was analysed based on the most common type of shade used in the fabrication of crown, whether it was A1, A2, B1, B2 etc. The data were tabulated and statistical analysis was done this process helped in determining the association for the occurrence of most common shade for crown fabrication in anteriors and posteriors in South Indian population.

The assessment of all such cases was done and the selected cases were divided into four broad groups. It was considered that all the teeth were endodontically treated ([Teja and Ramesh, 2019](#)). The first group was focused on cases where upper anteriors were studied and the second group was focused on lower anteriors, the third group was based on upper posteriors and the fourth group was based on lower posteriors ([Rajendran et al., 2019](#)). The questionnaire surveys can also be done to assess the knowledge of general practitioners ([Manohar and Sharma, 2018](#)), the present study was kind of a cross sectional study.

The study setting was a university kind of study. Patient record was reviewed and analysed the data of 86000 patients for appreciation for the kind of crown shade used after endodontic treatment of tooth was done ([Siddique, 2019](#); [Jose et al., 2020](#)). The other factors to check association were age, gender and presence of systemic diseases as systemic diseases could also lead to discoloured teeth ([Nasim and Nandakumar, 2018](#)) and appropriate shade selection has to be followed in such cases ([Ramesh et al., 2018](#); [Noor and Pradeep, 2016](#)). The data was collected from June 2019 to April 2020. Cases with the use of crown fabrication involved in entire dentition were selected and the case sheets were reviewed and the cross verification of the data was done for the errors and dropouts.

The data was harnessed from the server and was tabulated in the form of the excel sheet. This excel sheet was imported to IBM based Spss Statistics 20.0. The excel sheet tabulation included the following columns.

1.) Patient Identification Number

2.) Patient Name

3.) Age

4.) Gender

5.) Teeth number

6.) Shade Selected

The knowledgeable aspects of this study design are that the patient data is readily available and the ethnicity is a similar type. The disadvantage of such a study design is that the data location is not specific. The data reviewers were [1 researcher, 1 reviewer].

The choice of sampling was systematic sampling and the proper record was used to verify the sampling data. Data was accessed then patient identification record was accessed which was indicated by the Patient Identification numbers, then the treatment records ([Ramanathan and Solete, 2015](#)) was accessed out of all the patients endodontically treated teeth were selected which had undergone the procedure of crown fabrication and the further verification was done by cross verification with server records and patient photographs to minimize the sampling bias the inclusion was done of all available data internal validity was recorded as the sample was taken from university and for this validity proper record was checked and convenient sampling was chosen. The external validity was detected through the epidemiological perspective.

Independent variables used were age and gender. The dependent variables were crown shade cases, south Indian population and entire dentition. The type of analysis used was correlative association steps, values arranged tabulated and data were analysed by descriptive analytics.

RESULTS AND DISCUSSION

Out of total 617 cases studied the highest frequency of shade used for crown fabrication amongst the South Indian population was A2 in males and females, the second most commonly used shade was A1 in females and A3 in males.

A lot of factors are related to dental aesthetics which involves the operator to study the colour, the shape of existing teeth and the shape of the dental arch ([Koralakunte and Budihal, 2012](#)). Individual factors, sociodemographic factors and cultural factors play a significant role in the selection of cases ([Kavand et al., 2012](#)). The appearance of teeth is influenced by gender and age ([Willershhausen et al., 2010](#)). Perceived dental treatment on anterior teeth has a great impact on dental aesthetics ([Wolff et al., 2010](#)).

Table 1: Depicting the various age groups and the frequency count of patients

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 16-20 years	43	3.3	6.2	6.2
21-30 years	247	18.9	35.7	42.0
31-40 years	232	17.8	33.6	75.5
41-50 years	99	7.6	14.3	89.9
51-60 years	57	4.4	8.2	98.1
61-70 years	13	1.0	1.9	100.0
Total	691	52.9	100.0	
Missing System	615	47.1		
Total	1306	100.0		

Table 2: Depicting the gender and the frequency count of patients

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid female	319	24.4	46.2	46.2
male	372	28.5	53.8	100.0
Total	691	52.9	100.0	
Missing System	615	47.1		
Total	1306	100.0		

Table 3: Depicting the tooth region based frequency count of patients

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid upper anteriors	138	10.6	20.0	20.0
lower anteriors	7	.5	1.0	21.0
upper posteriors	314	24.0	45.4	66.4
lower posteriors	232	17.8	33.6	100.0
Total	691	52.9	100.0	
Missing System	615	47.1		
Total	1306	100.0		

Table 4: Depicting the shade frequency count of patients

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid A1	58	4.4	9.4	9.4
A2	372	28.5	60.3	69.7
A3	60	4.6	9.7	79.4
A3.5	4	.3	.6	80.1
B1	36	2.8	5.8	85.9
B2	57	4.4	9.2	95.1
B3	6	.5	1.0	96.1
A4	3	.2	.5	96.6
C1	7	.5	1.1	97.7
C2	6	.5	1.0	98.7
D2	8	.6	1.3	100.0
Total	617	47.2	100.0	
Missing System	689	52.8		
Total	1306	100.0		

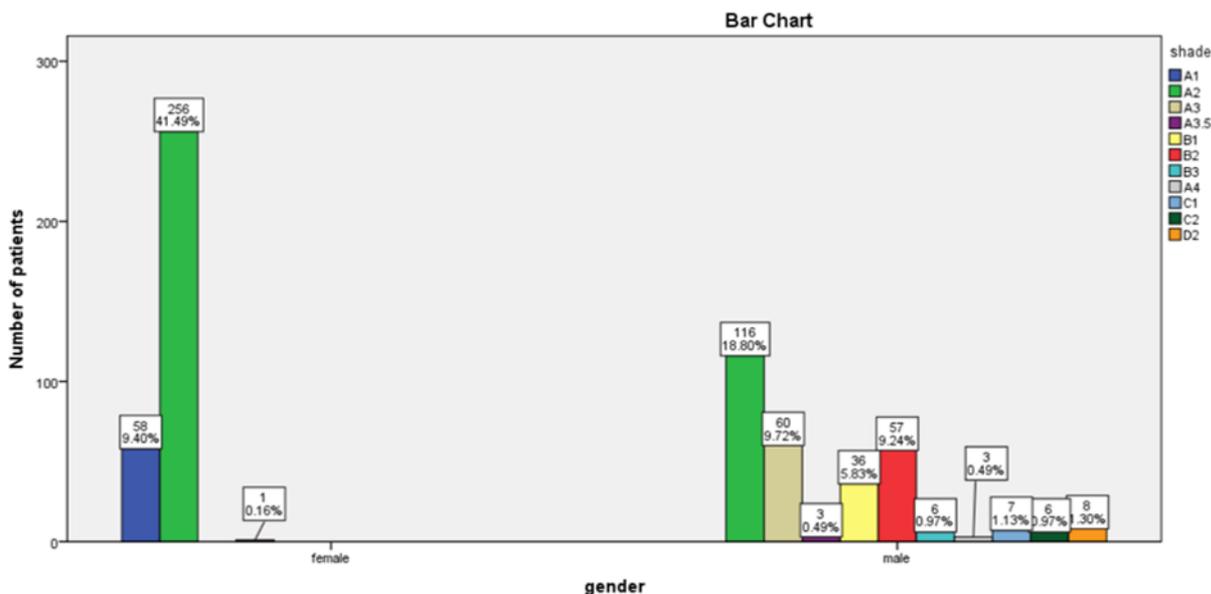


Figure 1: Barchart diagram depicting the most common shade selected for crown fabrication with respect to gender

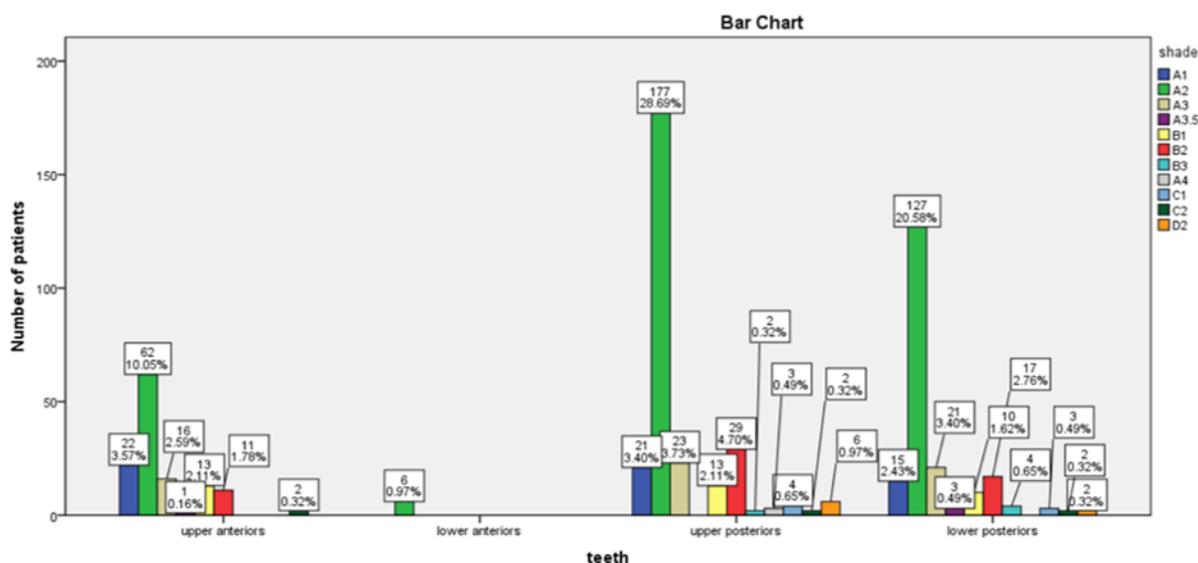


Figure 2: Barchart diagram depicting the most common shade selected with respect to the tooth region involved

The following relevant information was revealed from this study. Most cases were seen in the age group of 21 - 30 yrs with a frequency count of 247 at a percentage of 18.9%. Followed by the age group of 16 - 20 yrs had a frequency count of 43 and percentage of 3.3%. Out of total 691 cases studied the females for crown fabrication shade selection cases were at a frequency count of 319 and at a percentage of 24.4% [Table 2]. The males for crown fabrication shade selection cases were at a frequency count of 372 and at a percentage of 28.5%. The upper anterior tooth region based cases for crown fabrication shade selection cases were at a frequency count of 138 cases with a percentage of 10.6% [Table 3]. The lower anterior tooth region based cases for

of 7.6%. This data correlated to the fact that the importance of esthetic appearance decreases during the aging (Wulfman et al., 2010). The age group of 31 - 40 yrs at a count of 232 at a percentage of 17.8%. This age group is more prone to traumatic injuries and hence the crown fabrication plays a critical role in protecting the underlying tooth structure. The least frequency of crown fabrication was in the age group of 61-70 yrs at a frequency of 13 at a percentage of 1.0%. The age group of 51-60 yrs had a frequency count of 57 and at a percentage of 4.4%. The age group of 41-50 yrs had a frequency count of 99 and a percentage

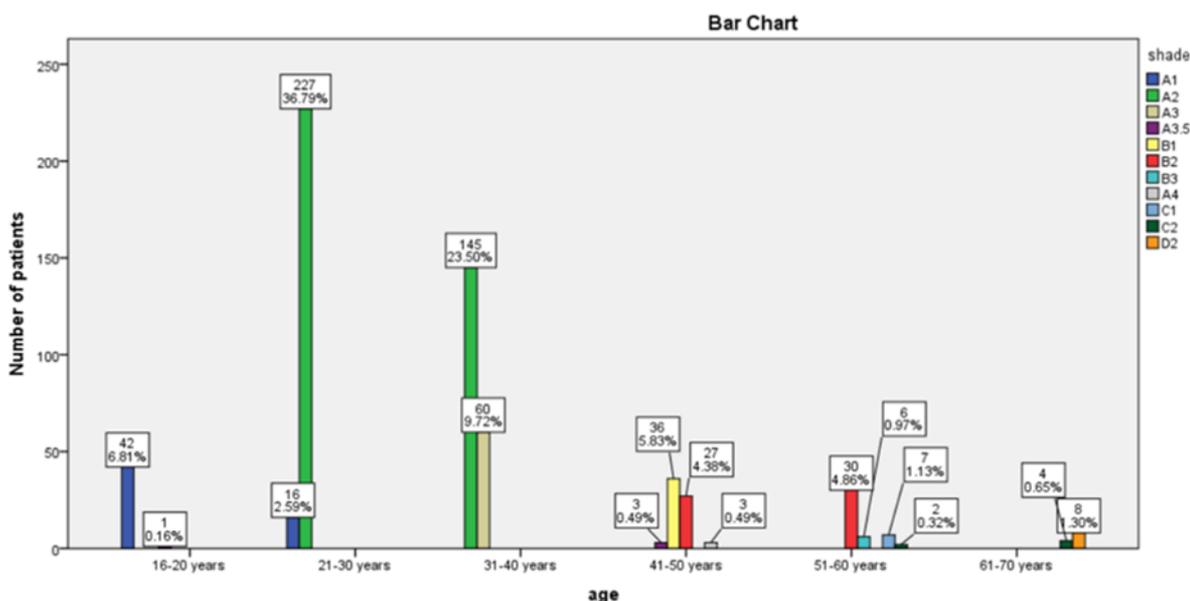


Figure 3: Barchart diagram depicting the most common crown fabrication shade selected with respect to multiple age groups involved

crown fabrication shade selection cases were at a frequency count of 7 cases with a percentage of 0.5%. The upper posterior tooth region based cases for crown fabrication shade selection cases were at a frequency count of 314 cases with a percentage of 24.0%. The lower posterior tooth region based cases for crown fabrication shade selection cases were at a frequency count of 232 cases with a percentage of 17.8%. When the shade selection was analysed it was found that A1 shade was at a frequency count of 58 of all the cases studied with a percentage of 4.4%. A2 shade was at a frequency count of 372 of all the cases studied with a percentage of 28.5% [Table 4]. This was the most commonly used shade found in the study where 617 cases were analysed. Dental appearance is a very important feature in determining the attractiveness of the face and thus plays a key role in human social interactions. The media and mass communication have provided a chance for educational awareness of other aesthetic materials (Kumar and Antony, 2018). Today, patients are not any longer satisfied with restorative solutions that provide ideal function without displaying restorations of lovely, natural-looking teeth. A patient's preference toward a lighter shade should be addressed during treatment progressing to match the patient's expectations for aesthetics and increase patient satisfaction of treatment outcome (Samorodnitzky-Naveh, 2010). A3 shade was at a frequency count of 60 of all the cases studied with a percentage of 4.6%. A3. Shade was at a frequency count of 4 of all the cases studied with a percentage of 0.3%. A4 shade

was at a frequency count of 3 of all the cases studied with a percentage of 0.2%. B1 shade was at a frequency count of 36 of all the cases studied with a percentage of 2.8%. B2 shade was at a frequency count of 57 of all the cases studied with a percentage of 4.4%. B3 shade was at a frequency count of 6 of all the cases studied with a percentage of 0.5%. C1 shade was at a frequency count of 7 of all the cases studied with a percentage of 0.5%. C2 shade was at a frequency count of 6 of all the cases studied with a percentage of 0.5%. D2 shade was at a frequency count of 8 of all the cases studied with a percentage of 0.6%. The most common shade used in female and male gender was shade A2, the least used shade in the female gender was A2 [Figure 1]. The least used shade in the male gender was A3.5. Other commonly used shades apart from A2 in males were A3, B2 and B1 [Figure 1]. The most common shade in the upper anteriors, lower anteriors, upper posteriors, lower posteriors was shade A2 [Figure 2]. Upper anteriors had second most common shade as A1 and upper posteriors had most common shade apart from A2 is B2 followed by A3, A1 and B1 [Figure 2]. The lower anterior had predominant shade as A2. The lower posteriors had the most common shade apart from A2 as A3 and B2, followed by B1 [Figure 3]. The most common shade was A1 in 16 - 20 yrs age group, A2 in 21 - 30 yrs age group, A2 in 31 - 40 yrs age group followed by A3, B1 in 41 - 50 yrs age group followed by B2, B2 in 51 - 60 yrs age group and D2 in 61 - 70 yrs age group [Figure 3]. Although composites offer faster treatment outcomes, dental ceramics play a critical role

in offering better colour stability with mechanical strength with higher clinical longevity (Ramamoorthi et al., 2015). The ceramic crowns also offer better esthetic appearance and compatibility with the adjacent periodontal tissues in comparison to the composite materials (Freire and Archegas, 2010). All ceramic restoration helps in providing the best esthetic outcome with an estimated survival rate of 98% in a 5yr time period (Kokubo et al., 2009).

CONCLUSIONS

Within the limitation of this study, it was found that the most common shade for crown fabrication used in the south Indian population was A2 shade, followed by A3 shade in males and A1 shade in females. The least commonly used shade was A4. The maximum cases which had a requirement of crown fabrication with esthetically pleasing shade were under the age group of 21 - 30 yrs.

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Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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