



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

Shree Ranjan Pandey, Subash Sharma*, Sowmya K

Department of Conservative Dentistry and Endodontics, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai-77, Tamil Nadu, India

Article History:

Received on: 24 Jul 2020
Revised on: 09 Oct 2020
Accepted on: 30 Dec 2020

Keywords:

Shade selection,
A2 shade,
Crown fabrication,
South Indian Population,
shade guide,
Munsell colour system

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.



*Corresponding Author

Name: Subash Sharma
Phone:
Email: subash@saveetha.com

ISSN: 0975-7538

DOI: <https://doi.org/10.26452/ijrps.v11iSPL4.3847>

Production and Hosted by

IJRPS | www.ijrps.com

© 2020 | All rights reserved.

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 sys-

tem 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 (Willershausen 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 | | |

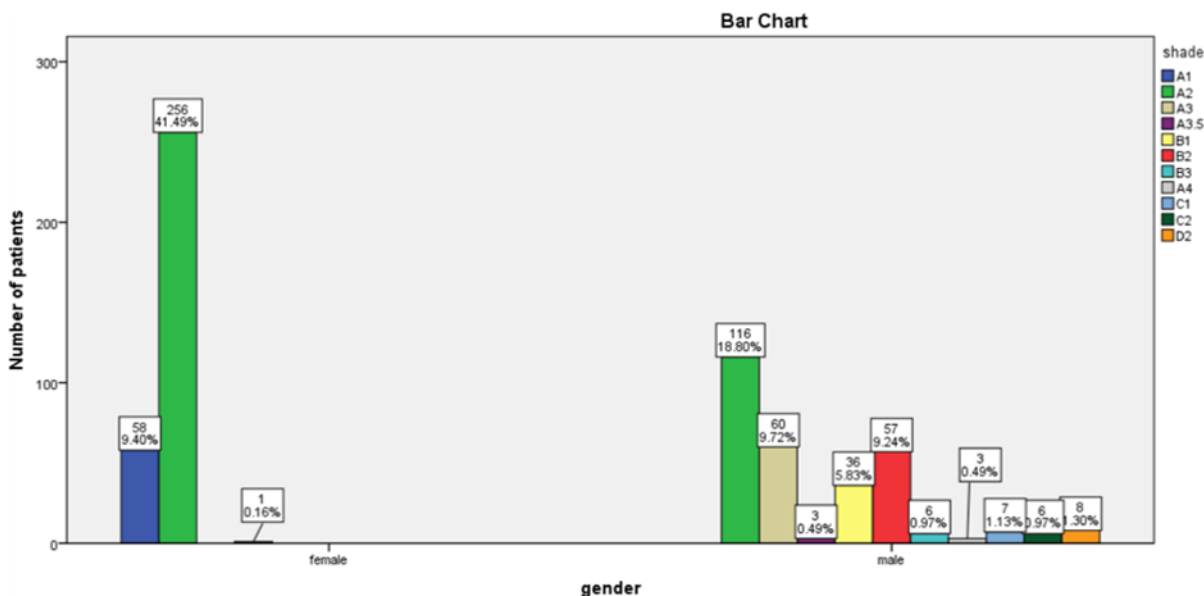


Figure 1: Barchart diagram depicting the most common shade selected for crown fabrication with respect to gender

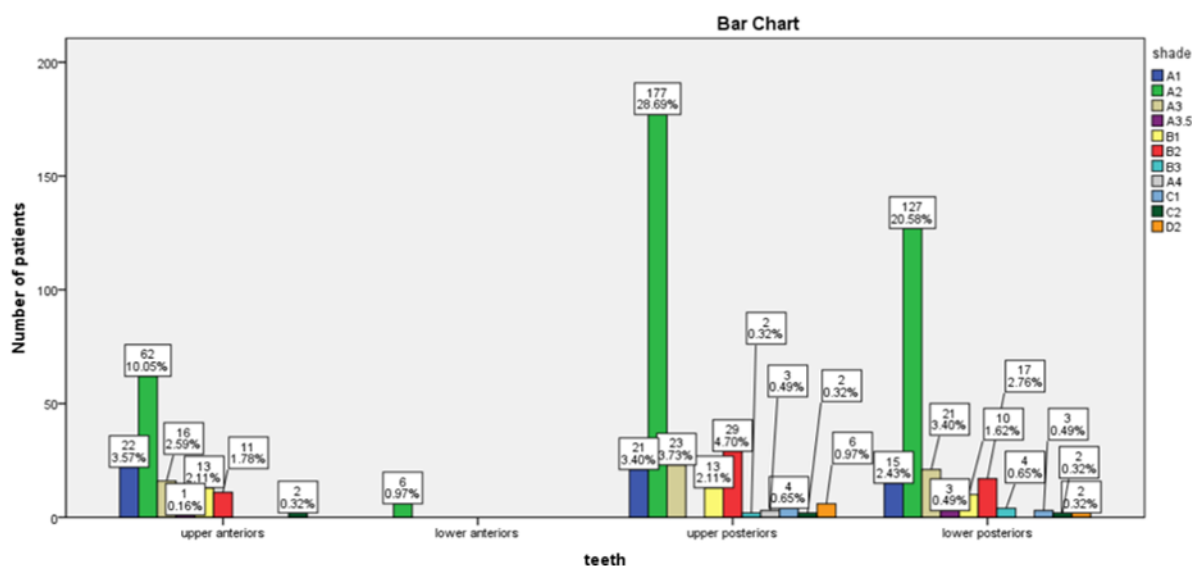


Figure 2: Barchart diagram depicting the most common shade selected with respect to the tooth region involved

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

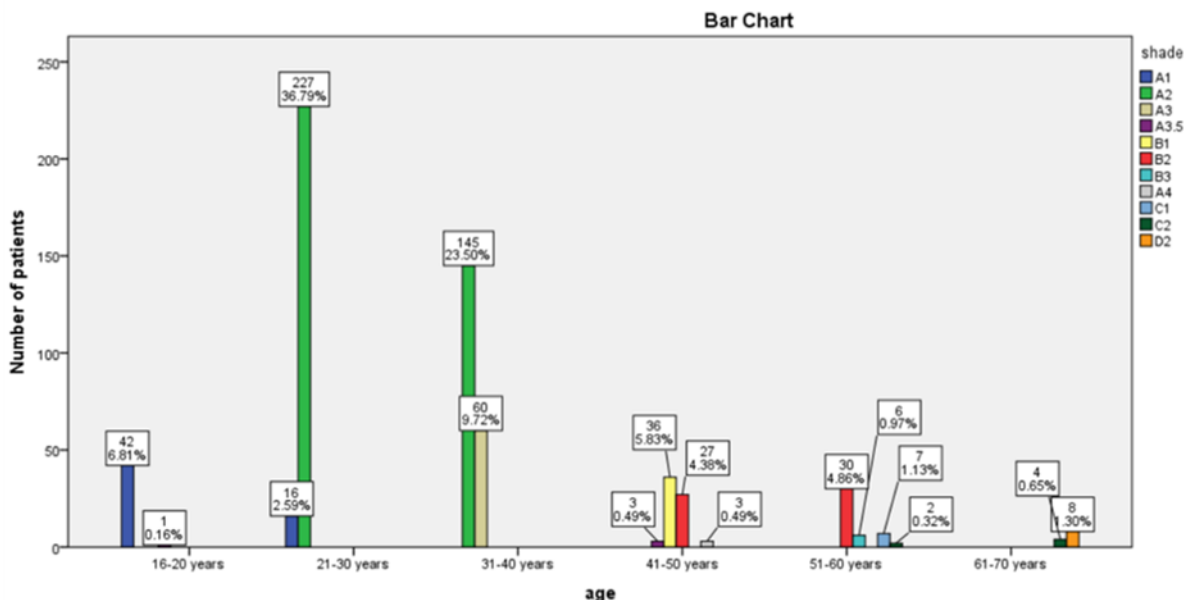


Figure 3: Barchart diagram depicting the most common crown fabrication shade selected with respect to multiple age groups involved

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.

Funding Support

The authors declare that they have no funding support for this study.

Conflict of Interest

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

REFERENCES

- Freire, A., Archegas, L. R. P. 2010. Porcelain laminate veneer on a highly discoloured tooth: a case report. *Journal (Canadian Dental Association)*, 76.
- Janani, K., Palanivelu, A., Sandhya, R. 2020. Diagnostic accuracy of dental pulse oximeter with customized sensor holder, thermal test and electric pulp test for the evaluation of pulp vitality: an in vivo study. *Brazilian Dental Science*, 23(1).
- Jose, J., P., A., Subbaiyan, H. 2020. Different Treatment Modalities followed by Dental Practitioners for Ellis Class 2 Fracture – A Questionnaire-based Survey. *The Open Dentistry Journal*, 14(1):59–65.
- Kavand, G., Broffitt, B., Levy, S. M., Warren, J. J. 2012. Comparison of dental esthetic perceptions of young adolescents and their parents. *Journal of Public Health Dentistry*, 72(2):164–171.
- Kokubo, Y., Sakurai, S., Tsumita, M., Ogawa, T., Fukushima, S. 2009. Clinical evaluation of Procera AllCeram crowns in Japanese patients: results after 5 years. *Journal of Oral Rehabilitation*, 36(11):786–791.
- Koralakunte, P. R., Budihal, D. H. 2012. A clinical study to evaluate the correlation between maxillary central incisor tooth form and face form in an Indian population. *Journal of Oral Science*, 54(3):273–278.
- Kumar, D., Antony, S. D. P. 2018. Calcified Canal and Negotiation-A Review. *Research Journal of Pharmacy and Technology*, 11(8):3727–3727.
- Lee, Y. K. 2005. Comparison of CIELAB and CIEDE2000 color-differences after polymerization and thermocycling of resin composites. *Dental Materials*, 21(7):678–682.
- Manohar, M., Sharma, S. 2018. A survey of the knowledge, attitude, and awareness about the principal choice of intracanal medicaments among the general dental practitioners and nonendodontic specialists. *Indian Journal of Dental Research*, 29(6):716–716.
- Nasim, I., Hussainy, S., Thomas, T., Ranjan, M. 2018. Clinical performance of resin-modified glass ionomer cement, flowable composite, and polyacid-modified resin composite in noncarious cervical lesions: One-year follow-up. *Journal of Conservative Dentistry*, 21(5):510–510.
- Nasim, I., Nandakumar, M. 2018. Comparative evaluation of grape seed and cranberry extracts in preventing enamel erosion: An optical emission spectrometric analysis. *Journal of Conservative Dentistry*, 21(5):516–516.
- Noor, S. S. S. E., Pradeep 2016. Chlorhexidine: Its properties and effects. *Research Journal of Pharmacy and Technology*, 9(10):1755–1755.
- Rajakeerthi, R., Nivedhitha, M. S. 2019. Natural Product as the Storage medium for an avulsed tooth – A Systematic Review. *Cumhuriyet Dental Journal*, 22(2):249–256.
- Rajendran, R., Kunjusankaran, R. N., Sandhya, R., Anilkumar, A., Santhosh, R., Patil, S. R. 2019. Comparative Evaluation of Remineralizing Potential of a Paste Containing Bioactive Glass and a Topical Cream Containing Casein Phosphopeptide-Amorphous Calcium Phosphate: An in Vitro Study. *Pesquisa Brasileira em Odontopediatria e Clínica Integrada*, 19:1–10.
- Ramamoorthi, S., Nivedhitha, M. S., Divyanand, M. J. 2015. Comparative evaluation of postoperative pain after using endodontic needle and EndoActivator during root canal irrigation: A randomised controlled trial. *Australian Endodontic Journal*, 41(2):78–87.
- Ramanathan, S., Solete, P. 2015. Cone-beam Computed Tomography Evaluation of Root Canal Preparation using Various Rotary Instruments: An in vitro Study. *The Journal of Contemporary Dental Practice*, 16(11):869–872.
- Ramesh, S., Teja, K., Priya, V. 2018. Regulation

- of matrix metalloproteinase-3 gene expression in inflammation: A molecular study. *Journal of Conservative Dentistry*, 21(6):592-592.
- Ravinthar, K., Jayalakshmi 2018. Recent Advancements in Laminates and Veneers in Dentistry. *Research Journal of Pharmacy and Technology*, 11(2):785-785.
- Samorodnitzky-Naveh, G. R. 2010. 'Patients' self-perception of tooth shade in relation to professionally objective evaluation. *Quintessence international*, 41(5):80-83.
- Siddique, R. 2019. Qualitative and quantitative analysis of precipitate formation following interaction of chlorhexidine with sodium hypochlorite, neem, and tulsii. *Journal of conservative dentistry*, 22(1):40-47.
- Teja, K. V., Ramesh, S. 2019. Shape optimal and clean more. *Saudi Endodontic Journal. Medknow Publications and Media Pvt. Ltd*, 9(3):235-235.
- Willershausen, B., Witzel, S., Schuster, S., Kasaj, A. 2010. Influence of gender and social factors on oral health, treatment degree and choice of dental restorative materials in patients from a dental school. *International Journal of Dental Hygiene*, 8(2):116-120.
- Wolff, D., Kraus, T., Schach, C., Pritsch, M., Mente, J., Staehle, H. J., Ding, P. 2010. Recontouring teeth and closing diastemas with direct composite buildups: A clinical evaluation of survival and quality parameters. *Journal of Dentistry*, 38(12):1001-1009.
- Wulfman, C., du Montcel, S. T., Jonas, P., Fattouh, J., Rignon-Bret, C. 2010. Aesthetic demand of French seniors: a large-scale study. *Gerodontology*, 27(4):266-271.