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Research Paper

Retrospective Assessment of Quality of Obturation of Maxillary Incisors in UG Clinic.

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ABSTRACT
INTRODUCTION
Root canal therapy is regarded as one the most important tasks that a dentist should perform during his/her career. In recent years, endodontic practice has considerably progressed in all aspects. Although, in more than 94 percent of cases, dentists are able to carry out root canal therapy successfully, there are several determinants factors in outcome assessment that should be taken into account with the technical quality of obturation being the most important one. A good quality obturation seals off the root canal and prevents reinfection.

AIM
The aim of the present study was to technically assess the quality of obturation in maxillary incisors done in UG clinics in a private dental institution.
MATERIALS AND METHODS
The study was done in a University setting. The data was collected by analysing the radiographs from the patient software system of Saveetha Dental College and the samples included patients who underwent root canal treatment in maxillary incisors by UG students. The data collected was tabulated and statistically analysed using the SPSS software version 21.0. The results were represented in the form of graphs. The level of significance was set at 0.05.
RESULTS
The overall quality of obturation was found to be better in terms of length(72%) , taper (82%) and density (88%) among all groups and there was no statistical significance ($p>0.05$).
CONCLUSION
The current study revealed that the overall quality of root canal treatment among undergraduate students was fairly high. The quality improved with years of clinical experience, with errors being more common among third years followed by final years and interns.
KEYWORDS: *Root canal; obturation; innovative technique; quality; novel method; treatment outcome.*

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I. INTRODUCTION

Endodontic treatment has always been a crucial part of total dental care. It serves as the necessary component for other subsequent therapies including post- and core- and prosthetic care. When there is an endodontic failure, the periodontium sustains significant harm because of the clear association between periodontal and pulpal health. (1) The technical quality of the root canal obturation as shown on radiographs has a substantial bearing on the outcome of endodontic treatment. (2)

One of the primary methods for evaluating the technical excellence of root canal therapy is radiographic evaluation.(3) The European Society of Endodontology(2006) has determined that root canal therapy is acceptable when the root canal obturation(0 to 2 mm) are radiographically shorter than the apex, dense without voids, and taper consistently. The institution has also anticipated graduating dental students to be capable of performing good and safe root canal therapy and to have a clear understanding of the potential for iatrogenic errors as well as strategies for managing and preventing them. However, there is an expectation set in "Learning Outcomes for Bachelor Degree Programs in Dentistry" by the National Commission for Academic Accreditation and Assessment (NCAAA, 2011), "Profile and Competencies for the Graduating European Dentist: Update 2009," "Competencies for the New General Dentist" by the American Dental Education Association (ADEA, 2011), and “Profile and Competencies for the Graduating European Dentist: Update 2009” that the pupils ought to have been taught the the ability to provide oral health care without any supervision during their undergraduate studies.

When evaluating the technical proficiency of graduating students, radiographic evaluation of the technical quality of root canal treatment plays a significant role. Similar research on the results of teaching endodontics to undergraduate students has been done in a number of other nations.(6) Our team has extensive knowledge and research experience that has translated into high quality publications.(7–16),(17–20),(21–25) (26).

The aim of the present study wass to technically assess the quality of obturation in maxillary incisors done in UG clinics in a private dental institution.

II. MATERIALS AND METHODOLOGY

The present study was a retrospective study that was conducted in a university setting. The ethical clearance for the study was obtained from the Institutional Scientific Review Board. The treatment records of patients who had undergone treatment in Saveetha Dental college between June 2019 to December 2020 were assessed for this study. The data collection and analysis was done by a single examiner. The inclusion criteria were patients who underwent root canal treatment in permanent maxillary incisors. Exclusion criteria for the study were incomplete case records and missing photographic proof of completed treatment. To avoid sampling bias, simple random sampling was done. Gender, age, tooth number was recorded for each patient.

Radiographs were analysed and quality of root canal filling was evaluated in regard to length of the obturation, density of filling material and taper of the canal. The length of obturation was analysed by measuring the distance between the upper surface of obturation material and tooth apex. Hence, proper length of obturation was considered when the end of obturation material was located at a distance lower than 2 mm from tooth apex. And, the obturation was considered as long when the location of obturating material was beyond the radiographic apex and the term short was used when the height of obturating material was more than 2 mm shorter than the height of the radiographic apex. In terms of taper, the obturation was considered as proper when a constant taper from coronal to apical aspect of the root was observed. If a constant taper was not appreciated in the radiograph, it was considered as improper. When the density of the obturation was analysed, an integrated obturation without any void between the filling and between the filling material and the canal wall was considered as proper. The term improper was used when the obturation contained void/voids.

The extracted data was tabulated in a spreadsheet (Excel 2017: Microsoft Office) and analysed using SPSS 21.0 version software (SPSS, Inc., Chicago). Descriptive statistics and chi-square tests were performed with the level of significance at 5% ($P<0.05$). The results were represented in the form of graphs.

III. RESULTS

The total study population was 50 patients. In this study population 50% belonged to the male gender and 50% to the female gender. The demographic data is represented in (**Figures 1 and 2)**.

Among the permanent maxillary incisors teeth evaluated, 24% were maxillary right central incisors(11), 22% were maxillary right lateral incisors(12), 32% maxillary left central incisors(21),maxillary

left lateral incisors(22) **(Figure 3)**. Correlation between year of study and quality of root canal filling was evaluated. Interns have done better obturation with minimal errors in terms of length of obturation when compared with third year and final year students **(Figure 4)**. On comparing the taper quality, the majority of interns (38%) have done proper work with minimal error when compared with third year and final year students **(Figure 5)**. When the density of filling material was compared, insufficient filling was observed more in obturation performed by third years followed by fourth years and interns **(Figure 6)**.

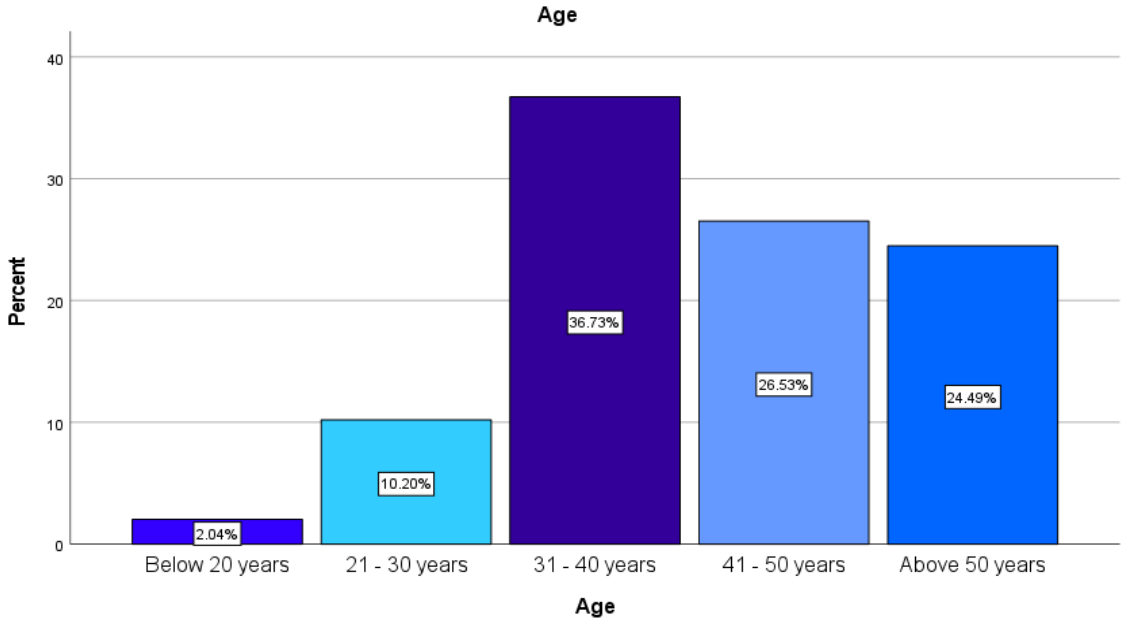

Figure 1: Bar graph represents the age distribution of patients in the sample population. 2% of the population was below 20 years, 10% of the population belonged to the 21-30 year age group, 36% of the population belonged to 31-40 years age group, 28% of the population belonged to 41-50 year age group and 24% of the population was above 50 years.

Figure 2: Bar chart represents the gender distribution of patients in the sample population. 50% of the sample population belonged to the male gender and 50% of the population belonged to the female gender.

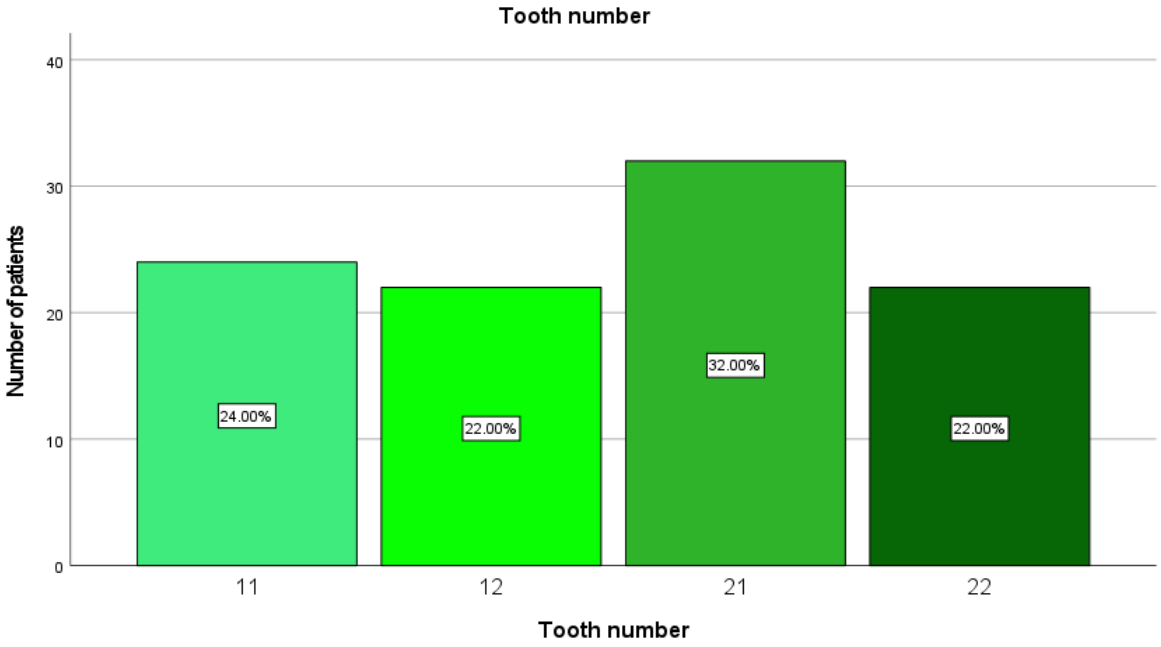

Figure 3: Bar graph represents the tooth number distribution of root canal treated maxillary incisors in the sample population. 24% were maxillary right central incisors(11), 22% were maxillary right lateral incisors(12), 32% maxillary left central incisors(21), maxillary left lateral incisors(22).

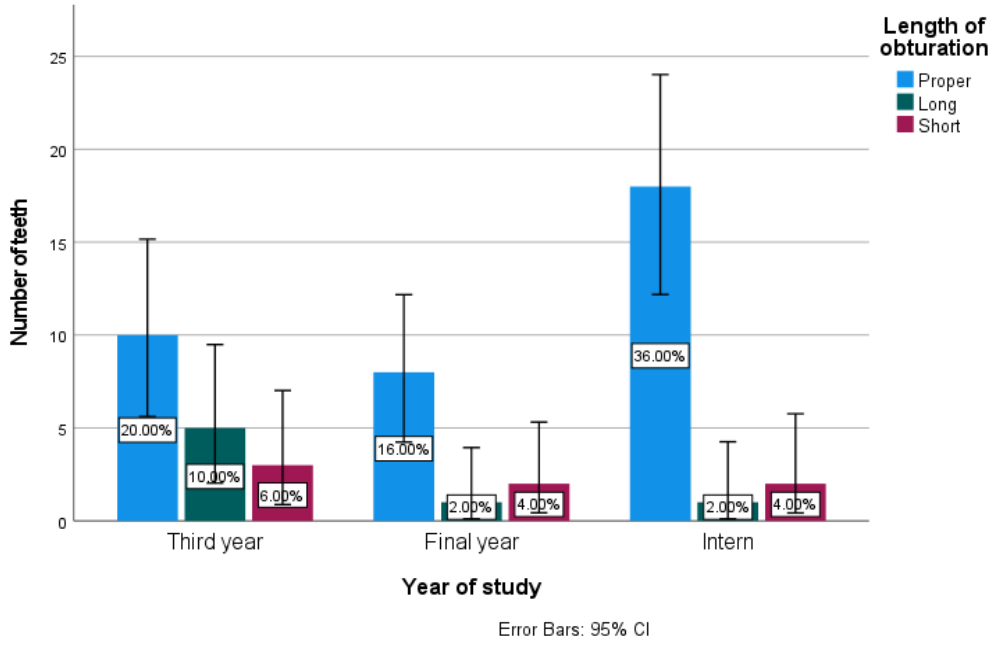

Figure 4: Bar Graph representing association of year of study and length of obturation. X- axis denotes year of study, Y-axis denotes the number of root canal treated maxillary incisors. Color blue represents proper length, color green represents long length and color maroon represents short length of obturation. Interns have done better obturation with minimal errors in terms of length of obturation when compared with third year and final year students. Chi square test was done and the association was however found to be not significant (p value = 0.226, p>0.05 statistically not significant).

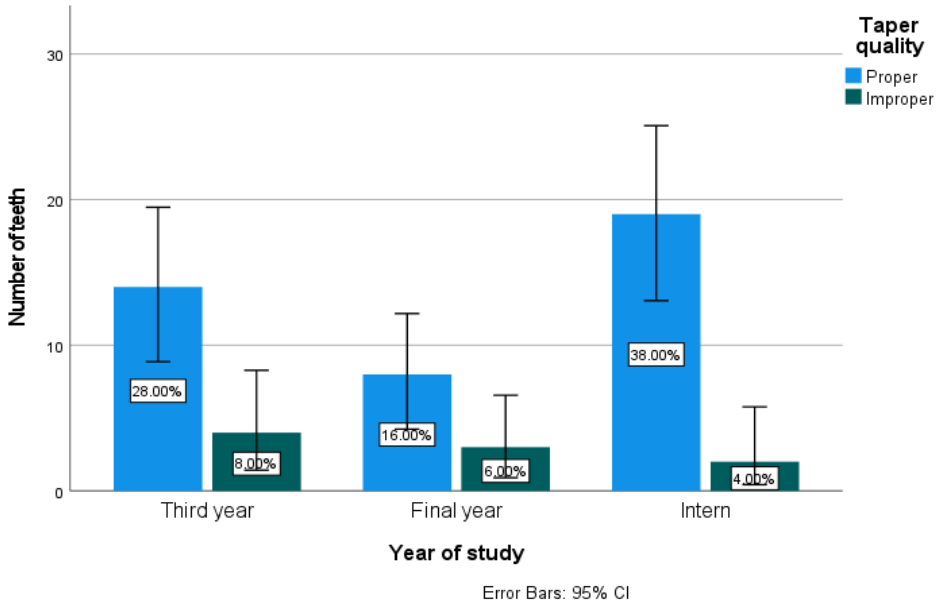

Figure 5: Bar Graph representing association of year of study and taper quality. X- axis denotes year of study, Y-axis denotes the number of root canal treated maxillary incisors. Color blue represents proper taper and color green represents improper taper. In terms of taper quality, the majority of interns (38%) have done proper work with minimal error when compared with third year and final year students. Chi square test was done and the association was found to be not significant (p value = 0.391, p>0.05 statistically not significant).

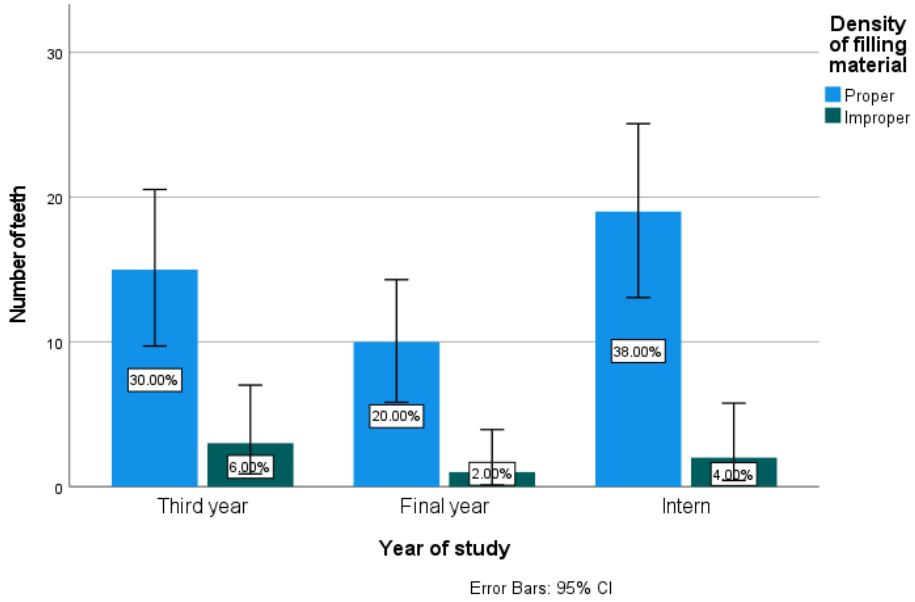

Figure 6: Bar Graph representing association of year of study and filling material density. X- axis denotes year of study, Y-axis denotes the number of root canal treated maxillary incisors. Color blue represents proper density and color green represents improper density. In terms of taper quality, the majority of interns (38%) have done proper work with minimal error when compared with third year and final year students. Chi square test was done and the association was found to be not significant (p value = 0.748, p>0.05 statistically not significant).

IV. DISCUSSION

In the present study, the quality of obturation of the maxillary incisors were analysed using three factors: The length, taper and density of the obturation. Studies have shown that there is a significant influence on the treatment outcome based on the length of obturation. Obturation ending with 0 - 2mm from the radiographic apex has the best prognosis. (27–29). In the present study, 72% of the individual root canal obturations had an acceptable length, which is higher when compared with other previous studies. (30-33) At an

Institutional setting, the students usually determine the working length radiographically using hand files and yet have demonstrated a relatively high percentage of acceptable length of obturation. This result is in contrast with a study by Tchorz, et al. which states that introducing electronic apex locators to the students at the pre clinical level has a significant influence on the quality of root canal treatment done by the dental students. (34)

In the present study, when the taper of the root canals was analysed, a high percentage of canals had proper taper (82%) which was higher when compared with the previous studies. (35,36) (33). A proper taper in the root canal is significant in facilitating the introduction of instruments and obturating materials into the canal. It reduces the potential for overextension of the obturation by resisting the obturating materials. (37)

The quality of the obturation was also analysed additionally by assessing the density of the obturation with respect to radiodensity and presence of voids within the obturation or between the obturation and canal wall. Previous studies have stated that inadequate density in the root canal has higher incidence of apical periodontitis due to microleakage. (38). In the present study, 88% of the root canal fillings had an acceptable density. This finding is higher when compared to findings of previous studies (33,35,36,39). The incidence of unacceptable density (12%) among undergraduate students could be in part due to the inexperience of the students and was seen to improve with experience.

The overall quality of root canal filling was satisfactory when compared to the similar studies. The limitations of the present study were, the small sample size, the treatment plan not being decided by a single operator was not included. Further large scale research which assesses the quality of the root canal treatment on multiple factors would better enable to identify the factor which requires improvement. This would in turn help improve the endodontic educational curriculum for dental graduates and result in better clinical outcomes.

V. CONCLUSION

The current study revealed that the overall quality of root canal treatment among undergraduate students was fairly high. The quality improved with years of clinical experience, with errors being more common among third years followed by final years and interns. It is essential to monitor the quality of RCTs by undergraduates as this will increase success of treatment by dental practitioners and reduce referral load to specialists. Further studies that assess quality of RCTs on a large scale involving student factors would help improve the curriculum and thereby increase the quality of treatment.

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CONFLICT OF INTEREST

The authors declare that there were no conflicts of interest in the present study.

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