



# RADIOGRAPHIC ANALYSIS OF ROOT CANAL TREATMENT DONE BY POSTGRADUATE STUDENTS IN AN UNIVERSITY DENTAL HOSPITAL

Priyadharshini. S<sup>[a]</sup>, Dr.Mahesh<sup>[b]</sup>\*

**Article History:** Received: 19.06.2022

Revised: 18.07.2022

Accepted: 17.08.2022

**Abstract: Introduction:** Dental caries can affect the tooth crown and, later in life, exposed root surfaces, and can occur in both primary and permanent dentitions. Preservation of both primary and permanent teeth during the functional dentition period is essential for proper oral hygiene. Endodontic treatment is a procedure that is carried out to maintain the health of pulp. The outcome of root canal therapy is immediately dependent on proper root canal cleaning and shape, while the long-term prognosis of a root canal treated tooth is more dependent on obturation quality. **Aim:** The aim of the study was to radiographically assess the quality of obturation in root canal treated teeth in patients under the age of 17. **Materials and methods:** The study was carried out from June 2020 to March 2021 on 134 patients (79 males and 55 females) who visited Saveetha dental College and Hospital, Chennai. Data collection included age, gender, tooth number and level of obturation and association between these were obtained using Pearson's chi-square test. **Results:** In this study we observed that the majority of males (59%) under the age of 17 had undergone root canal treatment. Based on the age categorisation, 57.5% patients belonged to the 11-15 years age group which was the highest. In this study it is seen that the most frequently reported tooth for root canal treatment was the Mandibular molars (41.8%). Based on the quality of obturation, it is seen that the majority of the root canal treated tooth for patients under the age of 17 had been obturated at the level of apex (56%). **Conclusion:** In this study it is seen that, root canal done by post graduates was mostly commonly in Mandibular molars and the quality of obturation was at the level of apex.

[a]. Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai 600077

[b]. Reader, Department of Pedodontics, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai 600077

## \*Corresponding Author

**E-mail:** 151701018.sdc@saveetha.com,  
mahesh@saveetha.com

**DOI: 10.31838/ecb/2022.11.06.019**

## INTRODUCTION

Preservation of both primary and permanent teeth during the functional dentition period is an important factor in achieving a good oral health in children in the process of growth and development of the child. (American Academy on Pediatric Dentistry Clinical Affairs Committee-Developing Dentition Subcommittee and American Academy on Pediatric Dentistry Council on Clinical Affairs, 2008)

Tooth caries is a complex, dynamic disease caused by biofilms that causes phasic demineralization and remineralization of dental hard tissues. Caries can affect the tooth crown and, later in life, exposed root surfaces, and can occur in both primary and permanent dentitions. (Pitts *et al.*, 2017)

Pulpal infection can be caused due to many risk factors. The commonest causes of pulp necrosis and periapical periodontitis includes dental caries, periodontal disease and dental trauma.

(Ahmed, Durr-E-Sadaf and Rahman, 2009; Ajayi *et al.*, 2010; Scavo *et al.*, 2011)

Endodontic treatment is a procedure that is carried out to maintain the health of all or part of the pulp when the pulp is diseased or injured, thereby preserving the tooth to prevent extraction due to pulpal pathology. (European Society of Endodontology, 2006)

One of the most popular procedures performed in dental clinics is endodontic therapy. As a result, clinicians must be knowledgeable with this therapeutic method. The outcome of root canal therapy is immediately dependent on proper root canal cleaning and shape, while the long-term prognosis of a root canal treated tooth is more dependent on obturation quality. Apical periodontitis is less common in teeth with adequate root canal fillings, hence this element is highly essential in the longevity of root canal treated teeth. (Boucher *et al.*, 2002; Barriehi-Nusair, Al-Omari and Al-Hiyasat, 2004; Ertas *et al.*, 2013)

Radiographic evaluation, alone or in combination with clinical or histological evaluation, is used to determine the success of root canal therapy. Instrumentation, radiographic obturation level, and density all influence the technical excellence of root canal therapy. (Ng, Mann and Gulabivala, 2010; Nagaraja, 2015)

Our team has extensive knowledge and research experience that has translated into high quality publications (Choudhari and Thenmozhi, 2016; Govindaraju, Jeevanandan and Subramanian, 2017; Ravi *et al.*, 2017; Vikram *et al.*, 2017; Gupta, Ariga and Deogade, 2018; Hannah *et al.*, 2018; Kavarthapu and Thamaraiselvan, 2018; Pandian, Krishnan and Kumar, 2018; Ramamurthy and Mg, 2018; Ashok and Ganapathy, 2019; Ramesh *et al.*, 2019; Sharma *et al.*, 2019;

Venu, Raju and Subramani, 2019; Wu *et al.*, 2019; Samuel, Acharya and Rao, 2020)

The aim of the study is to radiographically assess the quality of obturation in root canal treated teeth in patients under the age of 17.

## MATERIALS AND METHOD

### Study designs and Study setting

The present study was conducted in a university setting (Saveetha dental college and hospitals, Chennai, India). Thus the data available is of patients from the same geographic location and have similar ethnicity. The retrospective study was carried out with the help of digital case records of 134 patients who reported to the hospital. Ethical clearance to conduct this study was obtained from the Scientific Review Board of the hospital.

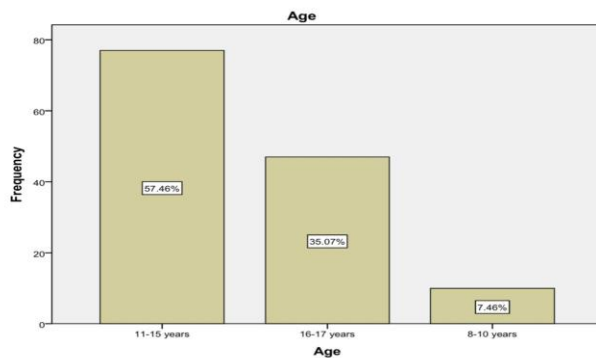
**Sampling:** Data of 134 patients (79 males and 55 females) were reviewed and then extracted. All patients under the age of 17 years who had undergone root canal treatment in the given duration of time period were evaluated. To minimise the sampling bias only relevant data was included. Simple random

sampling method was carried out. Data was cross verified with photographic evaluation by the presence of an additional reviewer. Incomplete data collection was excluded from the study.

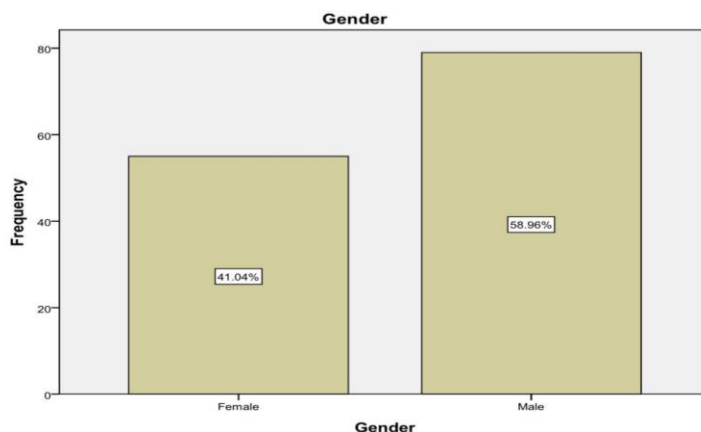
**Data Collection:** A single calibrated examiner evaluated the digital case records of patients who reported to Saveetha Dental College from June 2020 to March 2021. For the present study, inclusion criteria was data of patients under the age 17 and had undergone root canal treatment. Data obtained were age, gender, tooth number and level of obturation. All obtained data were tabulated into Microsoft excel documents.

**Statistical analysis:** The collected data was tabulated and analysed with Statistical Package for Social Sciences for Windows, version 20.0 (SPSS Inc., Vancouver style) and results were obtained. Categorical variables were expressed in frequency and percentage. Association between categorical variables was assessed using the chi-square test. Chi square tests were carried out using age, gender as independent variables and dependent variables. The statistical analysis was done using the Pearson chi square test. P value < 0.05 was considered statistically significant.

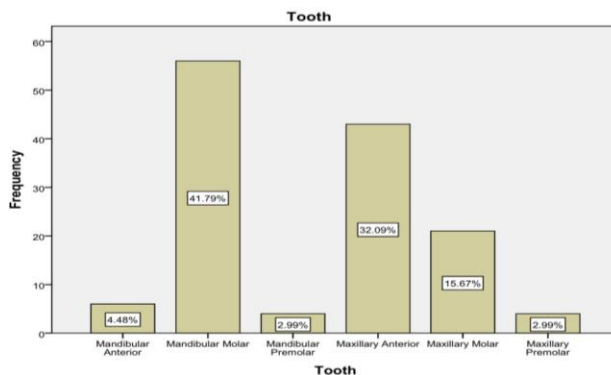
## RESULTS



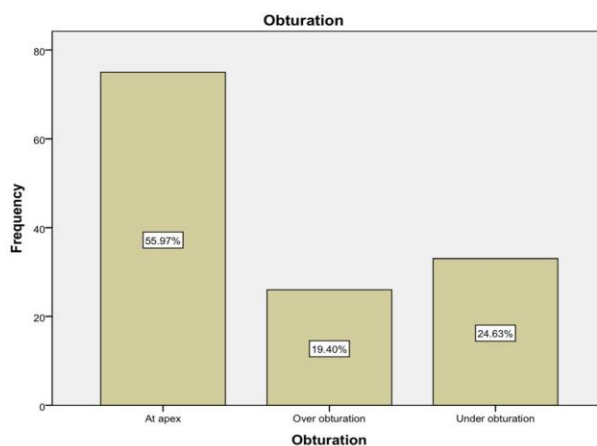
**Figure 1:** Bar graph shows frequency distribution of patients under the age of 17 and had undergone root canal treatment and age group. X-axis denotes the type of age group. Y-axis denotes the number of patients who had undergone root canal treatment. Highest prevalence was among the age group of 11-15 years (57.5%)



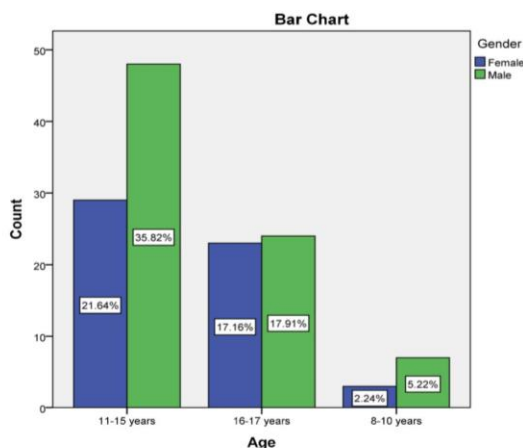
**Figure 2:** Bar graph shows frequency distribution of patients under the age of 17 and had undergone root canal treatment and gender. X-axis denotes the gender. Y-axis denotes the number of patients who had undergone root canal treatment. Highest prevalence was among the males (59%).



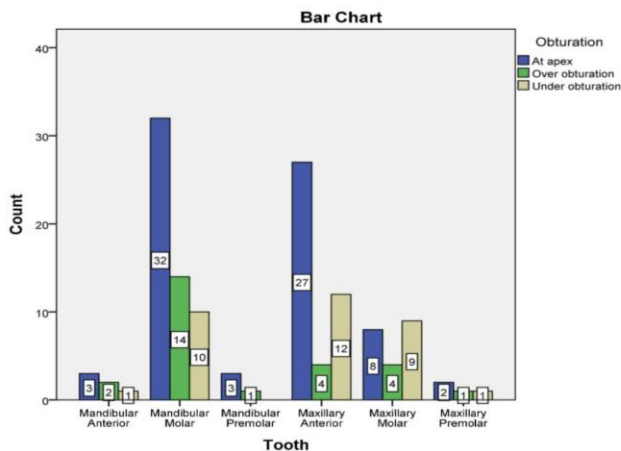
**Figure 3:** Bar graph shows frequency distribution of patients under the age of 17 and had undergone root canal treatment and root canal treated tooth. X-axis denotes the root canal treated tooth. Y-axis denotes the number of patients who had undergone root canal treatment. Highest prevalence of root canal treated teeth was in Mandibular molar (41.8%).



**Figure 4:** Bar graph shows frequency distribution of patients under the age of 17 and had undergone root canal treatment and level of obturation. X-axis denotes the level of obturation. Y-axis denotes the number of patients who had undergone root canal treatment. Highest prevalence was obturation at apex (56%).



**Figure 5:** Bar graph shows the association of patients under the age of 17 and had undergone root canal treatment and age group based on gender. X-axis denotes age group. Y-axis denotes number of patients under the age of 17 and had undergone root canal treatment based on gender. Males are denoted in green and females denoted in blue. Majority of the patients were male belonging to the age group 11-15 years.



**Figure 6: Bar graph shows the association of patients under the age of 17 and root canal treated tooth based on level of obturation. X-axis denotes root canal treated tooth. Y-axis denotes number of patients under the age of 17 and had undergone root canal treatment based on level of obturation. Majority of the patients had root canal treated in Mandibular molar and the level of obturation was at the apex.**

## DISCUSSION

Distribution of patients under the age of 17 and had undergone root canal treatment based on age group (Figure 1). 10 of the patients belonged to the age group of 8-10 years. (7.5%). 77 of the patients belonged to the age group of 11-15 years. (57.5%). 47 of the patients belonged to the age group of 16-17 years (35.1%). Highest prevalence was among patients under the age of 11-15 years. (57.5%). Distribution of patients under the age of 17 and had undergone root canal treatment based on gender (Figure 2). Out of 134 patients, 79 patients were males (59%) and 55 patients were females (41%). Males were higher compared to that of females (59%). Distribution of patients under the age of 17 and had undergone root canal treatment based on root canal treated tooth (Figure 3). Root canal treated in Mandibular anterior were 6 teeth (4.5%), 4 Mandibular premolar teeth (3%), 56 Mandibular molar teeth (41.8%), 43 maxillary anterior teeth (32.1%), 4 maxillary premolar teeth (3%), 21 maxillary molar teeth (15.7%). Mandibular molar was the most commonly treated root canal tooth, (41.8%). Distribution of patients under the age of 17 and had undergone root canal treatment based on level of obturation (Figure 4). Based on level of obturation, 75 patients had obturation at the level of apex (56%), 26 patients had obturation done beyond the apex (19.4%), 33 patients had obturation short of apex (24.6%). Highest prevalence was found to be obturation at the level of apex (56%).

Association of age group and gender is shown in Figure 5. Among males, 7 patients belonged to the age group of 8-10 years, 48 patients belonged to the age group of 11-15 years, 24 patients belonged to the age group of 16-17 years. Among females, 3 patients belonged to the age group of 8-10 years, 29 patients belonged to the age group of 11-15 years, 23 patients belonged to the age group of 16-17 years. (Chi-square value= 2.078; p value= 0.354). Association of root canal treated tooth and level of obturation is shown in Figure 6.

Among the level of obturation, 3 Mandibular anteriors, 3 Mandibular premolar, 32 Mandibular molar, 27 maxillary anterior, 2 maxillary premolar, 8 maxillary molar were obturated at level of apex. 2 Mandibular anteriors, 1 Mandibular premolar, 14 Mandibular molar, 4 maxillary anterior, 1

maxillary premolar, 4 maxillary molar were obturated at level of beyond of apex. 1 Mandibular anteriors, 10 Mandibular molar, 12 maxillary anterior, 1 maxillary premolar, 9 maxillary molar were obturated at level short of apex. (Chi-square value= 10.992; p value= 0.358).

This study states that the frequently treated root canal tooth was the Mandibular molars followed by anterior and the premolar. This correlates with the study by (Moradi and Gharechahi, 2014) which states that the study sample included 92 molar teeth, 61 anterior and 47 premolar teeth which had undergone root canal treatment.

This study states that root canal was carried out more in maxillary teeth compared to that of Mandibular teeth. This correlates with the study by (Moradi and Gharechahi, 2014) which includes 112 maxillary teeth and 88 Mandibular teeth.

Based on quality of the obturation, the Stuart states that majority of the obturation was at the level of apex followed by under obturation and over obturation. This correlates with the study by (Moradi and Gharechahi, 2014) which states that the majority of the length of root canal filling was adequate, followed by some under filled and overfilled canals.

The length and density of root canal obturation have been used to evaluate the radiographic quality of root canal treatment in most studies. (Lupi-Pegurier *et al.*, 2002; Dugas *et al.*, 2003) The adequate quality of root fillings demonstrated by this present study includes 56% of the teeth. The results shown by this study were higher compared to that of the study by (Hayes *et al.*, 2001) which was 13% and the study by (Eleftheriadis and Lambrianidis, 2005) which was 55%. The results of the study was lower compared to the study by (Benenati and Khajotia, 2002) which was 91% and the study by (Lynch and Burke, 2006) which was 63%.

## CONCLUSION

From this study it is seen that, root canal done by post graduates was mostly commonly in Mandibular molars and the quality of obturation was at the level of apex.

## REFERENCES

- i. Ahmed, H., Durr-E-Sadaf and Rahman, M. (2009) 'Factors associated with Non-Carious Cervical Lesions (NCCs) in teeth', *Journal of the College of Physicians and Surgeons--Pakistan: JCPSP*, 19(5), pp. 279–282.
- ii. Ajayi, Y.O. *et al.* (2010) 'Pattern of Endodontic Treatment in Children in a Nigerian Tertiary Hospital', *Nigerian Quarterly Journal of Hospital Medicine*. doi:10.4314/nqjhm.v19i1.50205.
- iii. American Academy on Pediatric Dentistry Clinical Affairs Committee-Developing Dentition Subcommittee and American Academy on Pediatric Dentistry Council on Clinical Affairs (2008) 'Guideline on management of the developing dentition and occlusion in pediatric dentistry', *Pediatric dentistry*, 30(7 Suppl), pp. 184–195.
- iv. Ashok, V. and Ganapathy, D. (2019) 'A geometrical method to classify face forms', *Journal of oral biology and craniofacial research*, 9(3), pp. 232–235.
- v. Barriehi-Nusair, K.M., Al-Omari, M.A. and Al-Hiyasat, A.S. (2004) 'Radiographic technical quality of root canal treatment performed by dental students at the Dental Teaching Center in Jordan', *Journal of Dentistry*, pp. 301–307. doi:10.1016/j.jdent.2004.01.002.
- vi. Benenati, F. and Khajotia, S. (2002) 'A Radiographic Recall Evaluation of 894 Endodontic Cases Treated in a Dental School Setting', *Journal of Endodontics*, pp. 391–395. doi:10.1097/00004770-200205000-00011.
- vii. Boucher, Y. *et al.* (2002) 'Radiographic evaluation of the prevalence and technical quality of root canal treatment in a French subpopulation', *International Endodontic Journal*, pp. 229–238. doi:10.1046/j.1365-2591.2002.00469.x.
- viii. Choudhari, S. and Thenmozhi, M.S. (2016) 'Occurrence and Importance of Posterior Condylar Foramen', *Journal of advanced pharmaceutical technology & research*, 9(8), p. 1083.
- ix. Dugas, N.N. *et al.* (2003) 'Periapical health and treatment quality assessment of root-filled teeth in two Canadian populations', *International Endodontic Journal*, pp. 181–192. doi:10.1046/j.1365-2591.2003.00640.x.
- x. Eleftheriadis, G.I. and Lambrianidis, T.P. (2005) 'Technical quality of root canal treatment and detection of iatrogenic errors in an undergraduate dental clinic', *International Endodontic Journal*, pp. 725–734. doi:10.1111/j.1365-2591.2005.01008.x.
- xi. Ertas, E.T. *et al.* (2013) 'Radiographic Assessment of the Technical Quality and Periapical Health of Root-Filled Teeth Performed by General Practitioners in a Turkish Subpopulation', *The Scientific World Journal*, pp. 1–7. doi:10.1155/2013/514841.
- xii. European Society of Endodontology (2006) 'Quality guidelines for endodontic treatment: consensus report of the European Society of Endodontology', *International endodontic journal*, 39(12), pp. 921–930.
- xiii. Govindaraju, L., Jeevanandan, G. and Subramanian, E. (2017) 'Clinical Evaluation of Quality of Obturation and Instrumentation Time using Two Modified Rotary File Systems with Manual Instrumentation in Primary Teeth', *Journal of clinical and diagnostic research: JCDR*, 11(9), pp. ZC55–ZC58.
- xiv. Gupta, P., Ariga, P. and Deogade, S.C. (2018) 'Effect of Monopoly-coating Agent on the Surface Roughness of a Tissue Conditioner Subjected to Cleansing and Disinfection: A Contact Profilometric In vitro Study', *Contemporary clinical dentistry*, 9(Suppl 1), pp. S122–S126.
- xv. Hannah, R. *et al.* (2018) 'Awareness about the use, ethics and scope of dental photography among undergraduate dental students dentist behind the lens', *Journal of advanced pharmaceutical technology & research*, 11(3), p. 1012.
- xvi. Hayes, S.J. *et al.* (2001) 'An audit of root canal treatment performed by undergraduate students', *International Endodontic Journal*, pp. 501–505. doi:10.1046/j.1365-2591.2001.00421.x.
- xvii. Kavarthapu, A. and Thamaraiselvan, M. (2018) 'Assessing the variation in course and position of inferior alveolar nerve among south Indian population: A cone beam computed tomographic study', *Indian journal of dental research: official publication of Indian Society for Dental Research*, 29(4), pp. 405–409.
- xviii. Lupi-Pegurier, L. *et al.* (2002) 'Periapical status, prevalence and quality of endodontic treatment in an adult French population', *International Endodontic Journal*, pp. 690–697. doi:10.1046/j.1365-2591.2002.00547.x.
- xix. Lynch, C.D. and Burke, F.M. (2006) 'Quality of root canal fillings performed by undergraduate dental students on single-rooted teeth\*', *European Journal of Dental Education*, pp. 67–72. doi:10.1111/j.1600-0579.2006.00397.x.
- xx. Moradi, S. and Gharechahi, M. (2014) 'Quality of root canal obturation performed by senior undergraduate dental students', *Iranian endodontic journal*, 9(1), pp. 66–70.
- xxi. Nagaraja, S. (2015) 'Quality of Root Canal Obturation Performed by Senior Undergraduate Dental Students', *International Journal of Public Health Science (IJPHS)*, p. 197. doi:10.11591/ijphs.v4i3.4733.
- xxii. Ng, Y.-L., Mann, V. and Gulabivala, K. (2010) 'Tooth survival following non-surgical root canal treatment: a systematic review of the literature', *International Endodontic Journal*, pp. 171–189. doi:10.1111/j.1365-2591.2009.01671.x.
- xxiii. Pandian, K.S., Krishnan, S. and Kumar, S.A. (2018) 'Angular photogrammetric analysis of the soft-tissue facial profile of Indian adults', *Indian journal of dental research: official publication of Indian Society for Dental Research*, 29(2), pp. 137–143.
- xxiv. Pitts, N.B. *et al.* (2017) 'Dental caries', *Nature reviews. Disease primers*, 3, p. 17030.
- xxv. Ramamurthy, J. and Mg, V. (2018) 'Comparison of effect of Hiora mouthwash versus Chlorhexidine mouthwash in gingivitis patients: A clinical trial',

- Asian journal of pharmaceutical and clinical research*, 11(7), p. 84.
- xxvi. Ramesh, A. *et al.* (2019) 'Esthetic lip repositioning: A cosmetic approach for correction of gummy smile - A case series', *Journal of Indian Society of Periodontology*, 23(3), pp. 290–294.
- xxvii. Ravi, S. *et al.* (2017) 'Additive Effect of Plasma Rich in Growth Factors With Guided Tissue Regeneration in Treatment of Intra-bony Defects in Patients With Chronic Periodontitis: A Split-Mouth Randomized Controlled Clinical Trial', *Journal of Periodontology*, pp. 839–845. doi:10.1902/jop.2017.160824.
- xxviii. Samuel, S.R., Acharya, S. and Rao, J.C. (2020) 'School Interventions-based Prevention of Early-Childhood Caries among 3-5-year-old children from very low socioeconomic status: Two-year randomized trial', *Journal of public health dentistry*, 80(1), pp. 51–60.
- xxix. Scavo, R. *et al.* (2011) 'Frequency and distribution of teeth requiring endodontic therapy in an Argentine population attending a specialty clinic in endodontics', *International Dental Journal*, pp. 257–260. doi:10.1111/j.1875-595x.2011.00069.x.
- xxx. Sharma, P. *et al.* (2019) 'Emerging trends in the novel drug delivery approaches for the treatment of lung cancer', *Chemico-biological interactions*, 309, p. 108720.
- xxxi. Venu, H., Raju, V.D. and Subramani, L. (2019) 'Combined effect of influence of nano additives, combustion chamber geometry and injection timing in a DI diesel engine fuelled with ternary (diesel-biodiesel-ethanol) blends', *Energy*, 174, pp. 386–406.
- xxxii. Vikram, N.R. *et al.* (2017) 'Ball Headed Mini Implant', *Journal of clinical and diagnostic research: JCDR*, 11(1), pp. ZL02–ZL03.
- xxxiii. Wu, F. *et al.* (2019) 'Biologically synthesized green gold nanoparticles from *Siberian ginseng* induce growth-inhibitory effect on melanoma cells (B16)', *Artificial Cells, Nanomedicine, and Biotechnology*, pp. 3297–3305. doi:10.1080/21691401.2019.1647224.