

A DATA ANALYSIS ON THE DISTANCE BETWEEN THE CORONAL REFERENCE POINT TO THE TENTATIVE CANAL STARTING POINT IN THE ANTERIOR WITH CALCIFIED CANAL- A DATA ANALYSIS IN UNIVERSITY.

¹Priyadharshini.S, ^{2*}Dr Sankeerthana Kolli, ³Dr Adimulapu Hima Sandeep

¹Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai 600077 Email ID: 151701018.sdc@saveetha.com

^{2*}Senior Lecturer, Department of Conservative Dentistry and Endodontics, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai 600077. Email ID: sankeerthanak.sdc@saveetha.com

³Reader, Department of Conservative Dentistry and Endodontics, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai 600077 Email ID: himas.sdc@saveetha.com

ABSTRACT:

Introduction: Pulpal canal calcification is also known as calcific Metamorphosis (CM) or Pulp obliteration. In calcific metamorphosis, the entry to the root canal system is complicated and is difficult to access the canal. This is because of the calcific deposits that cause a yellowish appearance of the tooth crown with darker hue and translucency loss in the pulp chamber. Maxillary central incisor was the most commonly reported calcified canal.

Aim: To analyze the distance between the tentative canal to the coronal reference point

Materials and methods: The study was carried out from June 2020 to March 2021 on 161 patients (60 males and 101 females) who visited Saveetha dental College and Hospitals, Chennai. Data collection included age, gender, type of tooth, distance between the tentative canal to the coronal reference point and association between these were obtained using Pearson's chi-square test.

Results: In this study we observed that the majority of females (62.7%) reported having calcified canal. Based on the age categorisation, 33.5% patients belonged to the age group of 31-40 years which was the highest. Highest prevalence of calcified canal was seen in the right maxillary central incisor (50.3%). Based on the distance of the canal to the coronal reference point, it is seen that 5.4mm to 5.6mm was most prevalent (17.4%).

Conclusion: In this study, it is observed that the majority of the maxillary central incisor with calcified canal had a distance of either 5.4mm or 5.6mm from the orifice of the tentative canal to the coronal reference point.

KEYWORDS: Maxillary Central Incisor, Calcified canal, Tentative canal, Dental innovation

INTRODUCTION

The deposition of calcified tissue along the canal walls is known as pulpal canal calcification (PCC). Pulpal canal calcification is also known as calcific Metamorphosis (CM) or Pulp

obliteration. The American Association for Endodontists defined it as “a pulpal response to trauma characterised by fast deposition of hard tissue within the canal space.”

(1)(2)

Pulpal canal calcification is caused by a variety of factors, the most common of which is dental trauma. The injury that occurs after dental trauma include protracted carious lesion, abfraction, restoration, and pulpal response to injury such as invasive pulp treatment methods are all possible causes of PCC. (3,4). The application of orthodontic force, which disrupts the blood supply, can cause PCC in adolescents. The root canal space in elderly adults is drastically limited due to secondary dentin deposition.(5–7)

In calcific metamorphosis, the entry to the root canal system is complicated and is difficult to access the canal. This is because of the calcific deposits that cause a yellowish appearance of the tooth crown with darker hue and translucency loss in the pulp chamber (8). Radiographically CM is classified as either Partial obliteration where the pulp chamber is not visible and the canal is markedly narrowed but visible. Total obliteration - Pulp chamber and canal is hardly visible. Obliteration can be either fibrotic or bone like cellular inclusions were seen in histology of osteodentine. Maxillary permanent incisor canal calcification was categorised by increase in collagen content and decrease in number of cells.

Our team has extensive knowledge and research experience that has translate into high quality publications(9–18),(19–22),(23–27)(28)

Aim of the present study was to assess the distance of the orifice from the coronal reference point to the tentative canal starting point of anterior calcified canal .

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 a similar geographic location and ethnicity. The retrospective study was carried out with the help of digital case records of 161 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 161 patients (60 males and 101 females) were reviewed and then extracted. Patients who had undergone root canal treatment in maxillary anterior calcified canal 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 presence of additional reviewers. 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 who had undergone root canal treatment in maxillary anterior calcified canal. Data obtained were age, gender, tooth number and distance between tentative canal and coronal reference point. 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 AND DISCUSSION:

Distribution of patients who had undergone root canal treatment in maxillary anterior calcified canal based on age group (Figure 1). 50 of the patients belonged to the age group of 21-30 years (31.1%), 54 of the patients belonged to the age group of 31-40 years (33.5%), 25 of the patients belonged to the age group of 41-50 years (15.5%), 32 patient belonged to the age group of 51-60 years (19.9%). Distribution of patients

who had undergone root canal treatment in a maxillary anterior calcified canal based on gender (Figure 2). Out of 161 patients, 60 patients were males (37.3%) and 101 patients were females (62.7%). Females were higher compared to that of males. Distribution of patients who had undergone root canal treatment in maxillary anterior calcified canal based on maxillary central incisor (Figure 3). Out of 161 patients, 81 were right maxillary central incisor (50.3%) and 80 were left maxillary central incisor (49.7%). Distribution of patients who had undergone root canal treatment in maxillary anterior calcified canal based on the distance between tentative canal and coronal reference point (Figure 4). Based on distance between tentative canal and coronal reference point, 28 patients had a distance of 5.4 mm and 5.6mm each (17.4%), 20 patients had a distance of 5.5mm (12.4%), 24 had a distance of 5.7mm (14.9%), 25 patients had a distance of 5.8mm (15.5%), 17 patients had a distance of 5.9 mm (10.6%), 19 patients had a distance of 6mm from the tentative canal and coronal reference point (19%).

Our present study revealed that the presence of calcification were more in the age group of 30-40 years. In comparison with other studies, age group of 21-30 years were more prevalent with calcified canal.(1)

Our present study revealed that females are more prone to calcified canal. This correlates with other studies.

The distance between the reference point to the tentative canal in the central incisor of maxillary teeth were 5.5 cm.

Severe pulpal calcification is a challenge in cases of apical periodontitis as there is increased risk of perforation and tooth loss.(29)Enlargement of the orifice is important to access the canal easily. Due to calcification, it leads to breakage of instrument while cleaning and shaping. Calcification also causes interference in blood supply. (30,31)Management of calcified canal is done with DG-16 explorer for location of canal orifice. Pathfinder CS used for penetrating calcified canal with their higher shaft strength. ((32,33)

Limitations of this study could be short sample size with restricted geography. Therefore, further research related to calcified canals may contribute additional information to the field of forensic medicine.

CONCLUSION:

From this study it is seen that, the majority of the maxillary central incisor with calcified canal had a distance of either 5.4mm or 5.6mm from the orifice of the tentative canal to coronal reference point. The calcification of root canals is a challenging problem for dentists to deal. Though negotiating and managing calcified canals might be difficult, if a suitable protocol is followed, they can be controlled. Skill, patience, and a well-stocked armamentarium are required to overcome the challenges and treat the calcified canal successfully.

AUTHOR CONTRIBUTIONS:

Priyadharshini.S :Literature search, data collection, analysis, manuscript drafting.

Dr. Kavalipurapu Venkata teja: Data verification, manuscript drafting.

ACKNOWLEDGEMENTS:

The authors would thank all the participants for their valuable support and authors thank the dental institution for the support to conduct.

CONFLICT OF INTEREST:

All the authors declare that there was no conflict of interest in present study.

SOURCE OF FUNDING:

The present project is supported/funded/sponsored by

- Saveetha Institute of Medical and Technical Sciences
- Saveetha Dental College and Hospitals

- Saveetha University
- Auditing Solutions, Trichy.

REFERENCES:

- Tavares WLF, Viana ACD, de Carvalho Machado V, Henriques LCF, Sobrinho APR. Guided Endodontic Access of Calcified Anterior Teeth [Internet]. Vol. 44, Journal of Endodontics. 2018. p. 1195–9. Available from: <http://dx.doi.org/10.1016/j.joen.2018.04.014>
- Kumar D, Delphine Priscilla Antony S. Calcified Canal and Negotiation-A Review [Internet]. Vol. 11, Research Journal of Pharmacy and Technology. 2018. p. 3727. Available from: <http://dx.doi.org/10.5958/0974-360x.2018.00683.2>
- Oginni AO, Adekoya-Sofowora CA, Kolawole KA. Evaluation of radiographs, clinical signs and symptoms associated with pulp canal obliteration: an aid to treatment decision [Internet]. Vol. 25, Dental Traumatology. 2009. p. 620–5. Available from: <http://dx.doi.org/10.1111/j.1600-9657.2009.00819.x>
- Juneja P, Kulkarni S. Clinical and radiographic comparison of biodentine, mineral trioxide aggregate and formocresol as pulpotomy agents in primary molars [Internet]. Vol. 18, European Archives of Paediatric Dentistry. 2017. p. 271–8. Available from: <http://dx.doi.org/10.1007/s40368-017-0299-3>
- Fleig S, Attin T, Jungbluth H. Narrowing of the radicular pulp space in coronally restored teeth [Internet]. Vol. 21, Clinical Oral Investigations. 2017. p. 1251–7. Available from: <http://dx.doi.org/10.1007/s00784-016-1899-8>
- Johnstone M, Parashos P. Endodontics and the ageing patient [Internet]. Vol. 60, Australian Dental Journal. 2015. p. 20–7. Available from: <http://dx.doi.org/10.1111/adj.12281>
- Kiefner P, Connert T, ElAyouti A, Weiger R. Treatment of calcified root canals in elderly people: a clinical study about the accessibility, the time needed and the outcome with a three-year follow-up. Gerodontology. 2017 Jun;34(2):164–70.
- Oginni AO, Adekoya-Sofowora CA. Pulpal sequelae after trauma to anterior teeth among adult Nigerian dental patients. BMC Oral Health. 2007 Aug 31;7:11.
- Muthukrishnan L. Imminent antimicrobial bioink deploying cellulose, alginate, EPS and synthetic polymers for 3D bioprinting of tissue constructs. Carbohydr Polym. 2021 May 15;260:117774.
- PradeepKumar AR, Shemesh H, Nivedhitha MS, Hashir MMJ, Arockiam S, Uma Maheswari TN, et al. Diagnosis of Vertical Root Fractures by Cone-beam Computed Tomography in Root-filled Teeth with Confirmation by Direct Visualization: A Systematic Review and Meta-Analysis. J Endod. 2021 Aug;47(8):1198–214.
- Chakraborty T, Jamal RF, Battineni G, Teja KV, Marto CM, Spagnuolo G. A Review of Prolonged Post-COVID-19 Symptoms and Their Implications on Dental Management. Int J Environ Res Public Health [Internet]. 2021 May 12;18(10). Available from: <http://dx.doi.org/10.3390/ijerph18105131>

- Muthukrishnan L. Nanotechnology for cleaner leather production: a review. *Environ Chem Lett.* 2021 Jun 1;19(3):2527–49.
- Teja KV, Ramesh S. Is a filled lateral canal - A sign of superiority? *J Dent Sci.* 2020 Dec;15(4):562–3.
- Narendran K, Jayalakshmi, Ms N, Sarvanan A, Ganesan S A, Sukumar E. Synthesis, characterization, free radical scavenging and cytotoxic activities of phenylvilangin, a substituted dimer of embelin. *ijps* [Internet]. 2020;82(5). Available from: <https://www.ijpsonline.com/articles/synthesis-characterization-free-radical-scavenging-and-cytotoxic-activities-of-phenylvilangin-a-substituted-dimer-of-embelin-4041.html>
- Reddy P, Krithikadatta J, Srinivasan V, Raghu S, Velumurugan N. Dental Caries Profile and Associated Risk Factors Among Adolescent School Children in an Urban South-Indian City. *Oral Health Prev Dent.* 2020 Apr 1;18(1):379–86.
- Sawant K, Pawar AM, Banga KS, Machado R, Karobari MI, Marya A, et al. Dentinal Microcracks after Root Canal Instrumentation Using Instruments Manufactured with Different NiTi Alloys and the SAF System: A Systematic Review. *NATO Adv Sci Inst Ser E Appl Sci.* 2021 May 28;11(11):4984.
- Bhavikatti SK, Karobari MI, Zainuddin SLA, Marya A, Nadaf SJ, Sawant VJ, et al. Investigating the Antioxidant and Cytocompatibility of *Mimusops elengi* Linn Extract over Human Gingival Fibroblast Cells. *Int J Environ Res Public Health* [Internet]. 2021 Jul 4;18(13). Available from: <http://dx.doi.org/10.3390/ijerph18137162>
- Karobari MI, Basheer SN, Sayed FR, Shaikh S, Agwan MAS, Marya A, et al. An In Vitro Stereomicroscopic Evaluation of Bioactivity between Neo MTA Plus, Pro Root MTA, BIODENTINE & Glass Ionomer Cement Using Dye Penetration Method. *Materials* [Internet]. 2021 Jun 8;14(12). Available from: <http://dx.doi.org/10.3390/ma14123159>
- Rohit Singh T, Ezhilarasan D. Ethanolic Extract of *Lagerstroemia Speciosa* (L.) Pers., Induces Apoptosis and Cell Cycle Arrest in HepG2 Cells. *Nutr Cancer.* 2020;72(1):146–56.
- Ezhilarasan D. MicroRNA interplay between hepatic stellate cell quiescence and activation. *Eur J Pharmacol.* 2020 Oct 15;885:173507.
- Romera A, Peredpaya S, Shparyk Y, Bondarenko I, Mendonça Bariani G, Abdalla KC, et al. Bevacizumab biosimilar BEVZ92 versus reference bevacizumab in combination with FOLFOX or FOLFIRI as first-line treatment for metastatic colorectal cancer: a multicentre, open-label, randomised controlled trial. *Lancet Gastroenterol Hepatol.* 2018 Dec;3(12):845–55.
- Raj R K, D E, S R. β -Sitosterol-assisted silver nanoparticles activates Nrf2 and triggers mitochondrial apoptosis via oxidative stress in human hepatocellular cancer cell line. *J Biomed Mater Res A.* 2020 Sep;108(9):1899–908.
- Vijayashree Priyadharsini J. In silico validation of the non-antibiotic drugs acetaminophen and ibuprofen as antibacterial agents against red complex pathogens. *J Periodontol.* 2019 Dec;90(12):1441–8.
- Priyadharsini JV, Vijayashree Priyadharsini J, Smiline Girija AS, Paramasivam A. In silico

- analysis of virulence genes in an emerging dental pathogen *A. baumannii* and related species [Internet]. Vol. 94, Archives of Oral Biology. 2018. p. 93–8. Available from: <http://dx.doi.org/10.1016/j.archoralbio.2018.07.001>
- Uma Maheswari TN, Nivedhitha MS, Ramani P. Expression profile of salivary micro RNA-21 and 31 in oral potentially malignant disorders. *Braz Oral Res.* 2020 Feb 10;34:e002.
 - Gudipani RK, Alam MK, Patil SR, Karobari MI. Measurement of the Maximum Occlusal Bite Force and its Relation to the Caries Spectrum of First Permanent Molars in Early Permanent Dentition. *J Clin Pediatr Dent.* 2020 Dec 1;44(6):423–8.
 - Chaturvedula BB, Muthukrishnan A, Bhuvanaraghan A, Sandler J, Thiruvengkatachari B. Dens invaginatus: a review and orthodontic implications. *Br Dent J.* 2021 Mar;230(6):345–50.
 - Kanniah P, Radhamani J, Chelliah P, Muthusamy N, Joshua Jebasingh Sathiya Balasingh E, Reeta Thangapandi J, et al. Green synthesis of multifaceted silver nanoparticles using the flower extract of *Aerva lanata* and evaluation of its biological and environmental applications. *ChemistrySelect.* 2020 Feb 21;5(7):2322–31.
 - Krasner P, Rankow H. Anatomy of the Pulp-Chamber Floor [Internet]. Vol. 30, Journal of Endodontics. 2004. p. 5–16. Available from: <http://dx.doi.org/10.1097/00004770-200401000-00002>
 - Carrotte P. Surgical endodontics. *Br Dent J.* 2005 Jan 22;198(2):71–9.
 - Vertucci FJ. Root canal morphology and its relationship to endodontic procedures [Internet]. Vol. 10, Endodontic Topics. 2005. p. 3–29. Available from: <http://dx.doi.org/10.1111/j.1601-1546.2005.00129.x>
 - Siddiqui SH. Management of Pulp Canal Obliteration Using the Modified-Tip Instrument Technique [Internet]. Vol. 8, International Journal of Health Sciences. 2014. p. 425–7. Available from: <http://dx.doi.org/10.12816/0023999>
 - Kaushik A, Nawal R, Talwar S, Yadav S, Chaudhary S. Management of iatrogenic root perforation with pulp canal obliteration [Internet]. Vol. 4, Saudi Endodontic Journal. 2014. p. 141. Available from: <http://dx.doi.org/10.4103/1658-5984.138148>

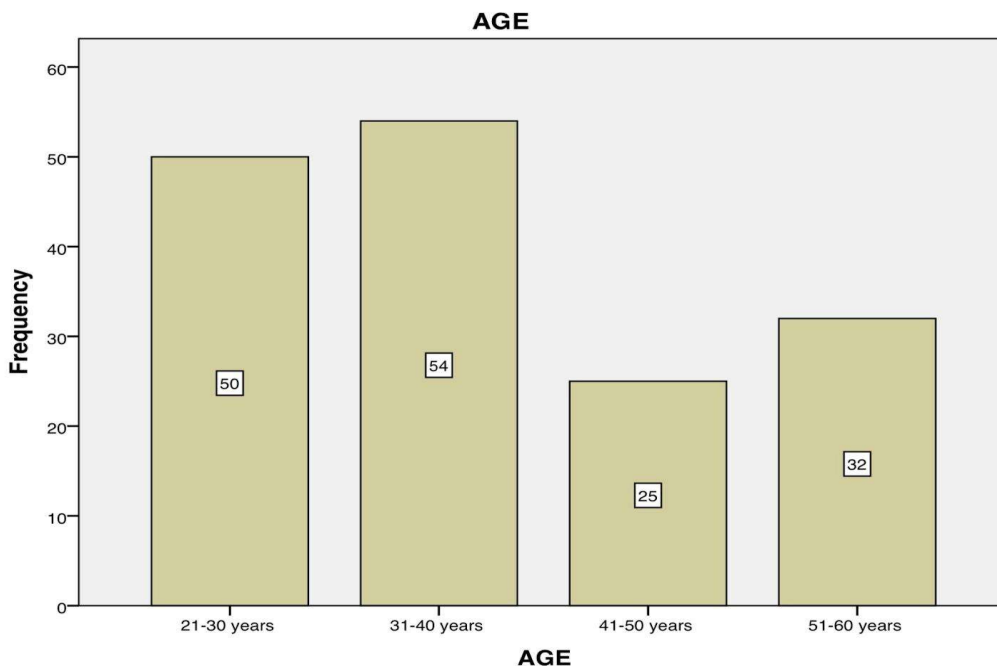


Figure 1: Bar graph shows frequency distribution of patients who had undergone root canal treatment in maxillary anterior calcified canal and age group. X-axis denotes the type of age group. Y-axis denotes the number of patients with calcified maxillary central incisor. Highest prevalence was among the age group of 31-40 years. (33.5%)

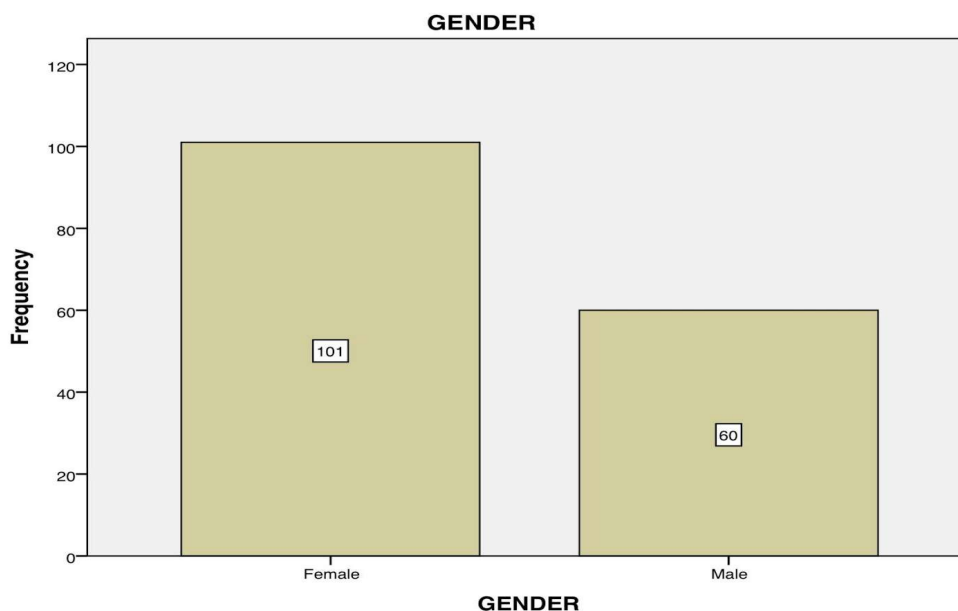


Figure 2: Bar graph shows frequency distribution of patients who had undergone root canal treatment in maxillary anterior calcified canal and gender. X-axis denotes the gender of patient. Y-axis denotes the number of patients with calcified maxillary central incisor. Highest prevalence was among the females compared to that of males. (62.7%).

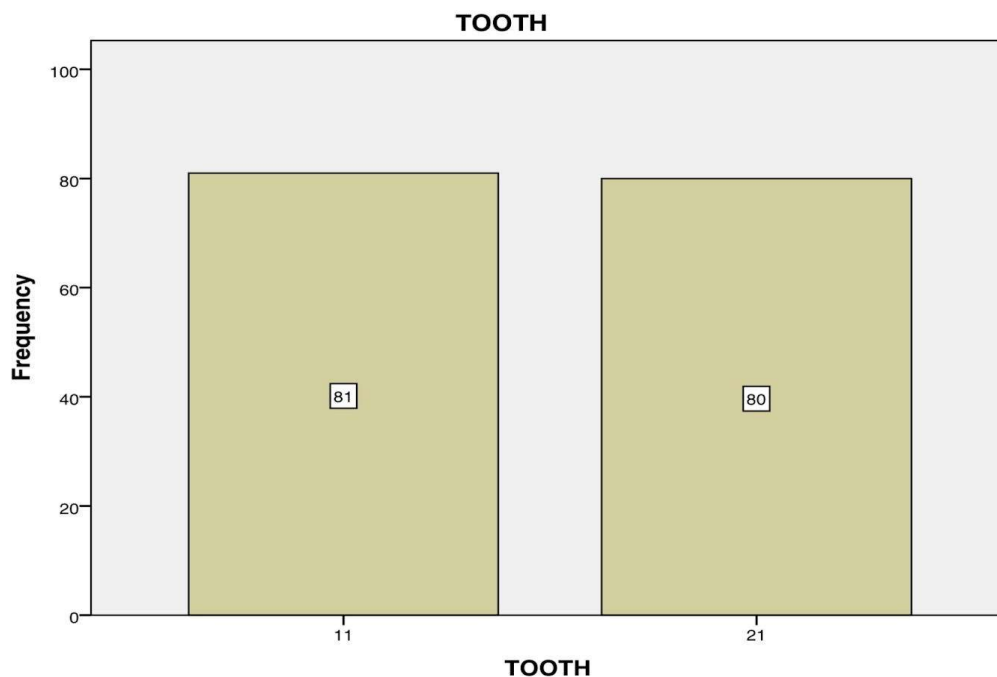


Figure 3: Bar graph shows frequency distribution of patients who had undergone root canal treatment in maxillary anterior calcified canal and maxillary central incisor. X-axis denotes the maxillary central incisor. Y-axis denotes the number of patients with calcified maxillary central incisor. Highest prevalence was seen in maxillary right central incisor (50.3%).

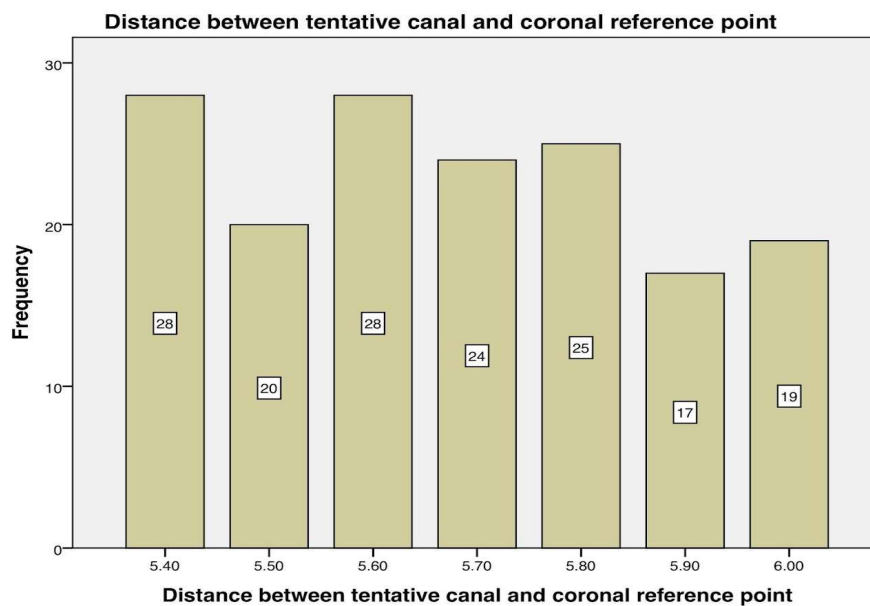


Figure 4: Bar graph shows frequency distribution of patients who had undergone root canal treatment in maxillary anterior calcified canal and distance between the tentative canal and coronal reference point. X-axis denotes the distance between the tentative canal and coronal reference point. Y-axis denotes the number of patients with calcified maxillary central incisor. Highest prevalence was seen in patients who had a distance of both 5.4 mm and 5.6 mm each (17.4%).

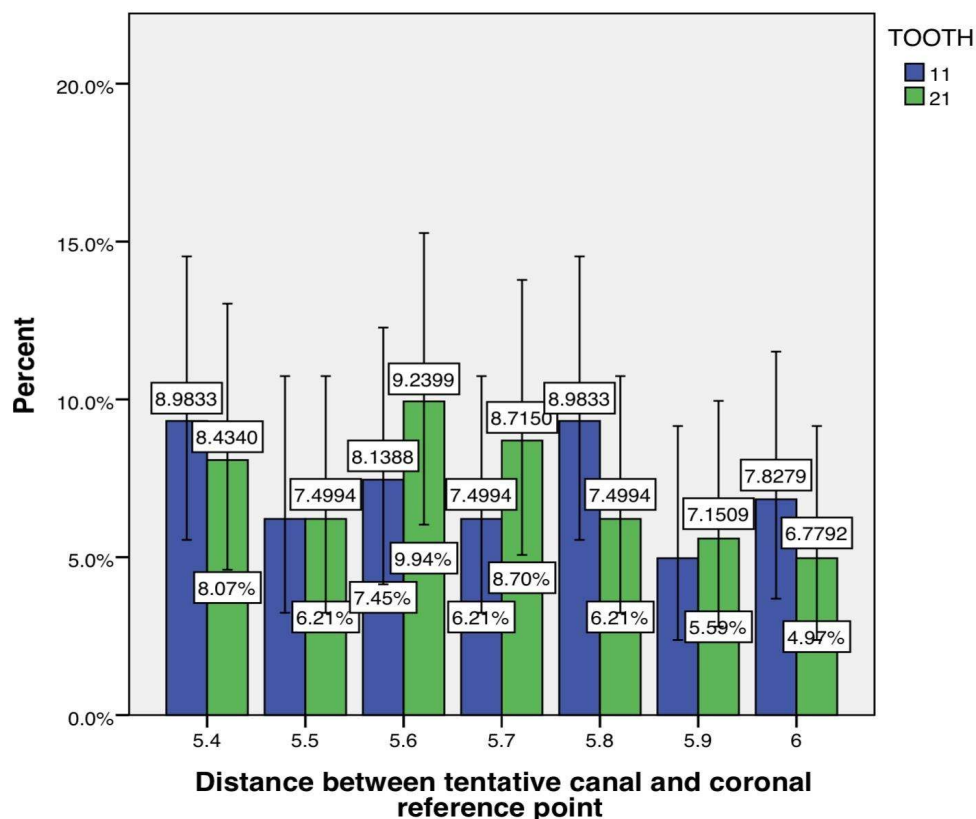


Figure 5: Bar graph shows the association of patients who had undergone root canal treatment in maxillary anterior calcified canal and distance between the tentative canal and coronal reference point. X-axis denotes the distance between the tentative canal and coronal reference point. Y-axis denotes number of patients who reported calcified canal in maxillary central incisor. Maxillary right central Incisor denoted in blue, Maxillary left central incisor denoted in green.