

Association of Age And Gender Distribution of Patients Reported with Open Apex in Maxillary Central Incisor

Balaji V¹, Surendar Sugumaran²

¹Research Associate, Dental Research Cell, ²Senior Lecturer, Department of Conservative Dentistry and endodontics, ²Reader, Department of Oral Medicine and Radiology, Saveetha Dental College and Hospitals, Saveetha Institute of medical and technical sciences (SIMATS), Saveetha university, Chennai, Tamilnadu, India

Abstract

Usually open apex is associated with young people who develop early cavities, have a morphological anomaly or have suffered a dental trauma that prematurely halts root development. The aim of this study is to assess the association of age and gender distribution of patients reported with Open apex in maxillary central incisor. The study setting is mainly a type of university based and a single centered study. This retrospective study examined the record of patients from June 2019 to April 2020 who underwent treatment at Saveetha Dental College, Chennai. Patients' details were collected to assess the association of age and gender distribution of patients reported with Open apex in maxillary central incisor. A total of 270 patient details were evaluated. Patients were divided into 3 groups. Below 18 years, 18 to 50 years and above 50 years. Patients' records were reviewed and then data was extracted. Data was recorded in Excel and later exported to IBM SPSS software (Version 21: IBM Corporation NY USA). Pearson chi square test was done to statistically analyze the data. Patients of all age groups were included in this study. Around 40.15% of the patients were in the age group of 10-20 years, 21.19% were between the age of 20-30 years, 22.30% were between the age group of 30-40 years and 16.36% of the patients were in the age group of 40-50 years. Around 60.2% and 39.8% reported with open apex in 11 and 21 respectively of which 51.7% male and 48.3% female patients respectively. Within the limits of this study, the age group of 10 - 20 years had been diagnosed with most number of open apices in Maxillary central incisors. Which were 65 patients (24.16%) in 11 and 43 patients (15.99%) in 22 respectively. Majority of patients with age group 10-20 years reported a higher incidence of open apex than other age groups.

Keywords: Age; Gender; Diagnosis; Maxillary central incisors; Open apex

Introduction

The endodontic treatment of permanent teeth with open apices and necrotic pulp is considered one of the most complex challenges for clinicians. Usually, these teeth are associated with young people who develop early

cavities, have a morphological anomaly or have suffered a dental trauma that prematurely halts root development (1). However, adults with completely formed roots can develop an open apex due to certain pathological (e.g., external inflammatory root resorption) (2,3) or iatrogenic (over-instrumentation) (4) factors that modify mature apical lumen diameter. Therefore, such teeth show thin radicular walls with increased susceptibility to fracture, and the wide lumen of the apical foramen makes it difficult to maintain the filling material inside the root canal system and impossible for proper mechanical cleaning to avoid excessive root weakness (5-8). All of these characteristics compromise the long term health of the tooth.

Corresponding author

Surendar Sugumaran

Senior lecturer, Department of Conservative Dentistry and Endodontics, Saveetha Dental College and Hospitals, Saveetha Institute of medical and technical sciences (SIMATS), Saveetha university, Chennai, Tamilnadu, India,

Mail id: surendars.sdc@saveetha.com,

The anatomy of the apical foramen changes with age as root formation has yet to be completed when teeth erupt(9). The completion of root development and closure of the apex occurs up to three years after eruption. The causes of open apices can be due to incomplete development, Necrosis of pulp due to caries or trauma before root formation is completed, Extensive apical resorption, Root-end resection and over instrumentation. Ideal management would involve regeneration of new pulpal tissue and continued root formation(10)¹. Novel techniques for dealing with immature apices such as apexogenesis sometimes claim to be regenerative techniques. However, assessment of the composition of this regenerated tissue has proven to be difficult and it seems that it is made up of periodontal and bone tissue rather than tissue of pulpal origin

The assessment of dental maturity is a typical strategy employed by some dental specialities (e.g. forensic dentistry)¹⁽¹¹⁻¹³⁾, but few studies have examined the stage of root development in relation to the frequency of teeth with open apices and necrotic pulp^(14,15). Several classification systems for the degree of root formation and maturation have been proposed^(16,17), although Cvek's⁽¹⁸⁾ classification offers didactic radiographic characteristics with valuable clinical applications.

Cvek's classification describes the five stages of root development. I = < 1/2 root length, II = 1/2 root length, III = 2/3 root length, IV = wide open apical foramen and nearly complete root length and, V = closed apical foramen and completed root development. While Cvek stage V describes mature, fully formed teeth, the remaining four stages describe teeth with open apices and a lack of apical constriction development but significant morphological differences. Cvek stages I, II and III indicate wide and divergent apical openings, the root canals are significantly wider in the buccal-lingual plane than in the mesio-distal plane, the terminal portion of the root is irregular and the apical foramen diameter is higher than the root canal lumen⁽¹⁹⁾. In contrast, stage IV is associated with noticeable root length and convergent apical walls. Therefore, considering that endodontic procedure selection most likely depends on the maturity of the affected root. The aim of this study is to assess the association of age and gender distribution of patients reported with Open apex in maxillary central incisor.

Materials and Methods

Study design and setting:

The study setting is mainly a type of university based and a single centered study. This retrospective study examined the record of patients from June 2019 to April 2020 who underwent treatment at Saveetha Dental College, Chennai. The study population includes patients who underwent treatment for open apex. The main advantage of this study is that flexible data can be obtained immediately and less expensively but the drawback of this study is that they have geographic limitations and involve the people of an isolated population. Ethical approval was applied to the institutional ethics community, SIMATS.

Data Collection:

Data was obtained from Saveetha Dental College and Hospital. The record of patients were examined from June 2019 to April 2020 who underwent treatment at Saveetha Dental College, Chennai. The study population includes patients who underwent dental post cementation and core build-up procedures. To evaluate the number of prefabricated fiber posts placed in Maxillary central incisors with 2 or more walls present 143 case records of patients. Patients records were reviewed and then data was extracted. Patients of all age groups were included in this study. Patients were divided into 3 groups. Below 18 years, 18 to 50 years and above 50 years. Repeated patient records, incomplete data without proper notes were excluded from the data. The data was recorded, tabulated and the percentage calculated.

Statistical Analysis

Data was recorded in Excel and later exported IBM SPSS software (Version 21: IBM Corporation NY USA). Descriptive statistics (frequencies and percentages) were calculated to explore the general features of the data. Pearson chi square test was done to statistically analyze the data. Pearson chi square test was used to identify any significant level of variation. Ethical approval was obtained from the Institutional Ethical Committee. Approval number (SDC/SHIEC/2020/

DIASDATA/0619-0320)

Results and Discussion

Patients of all age groups were included in this study. Around 40.15% of the patients were at the age group of 10-20 years, 21.19% were between the age of 20-30 years, 22.30% were between the age group of 30-40 years and 16.36% of the patients were at the age group of 40-50 years (Figure 1). 51.7% and 48.3% male and female patients respectively (Figure 2), Of which 60.2% and 39.8% Reported with open apex in 11 and 21 respectively (Figure 3). (Figure 4) shows that the age group of 10 - 20 years had been diagnosed with most number of open apices in Maxillary central incisors. Which were 65 patients (24.16%) in 11 and 43 patients (15.99%) in 22 respectively.

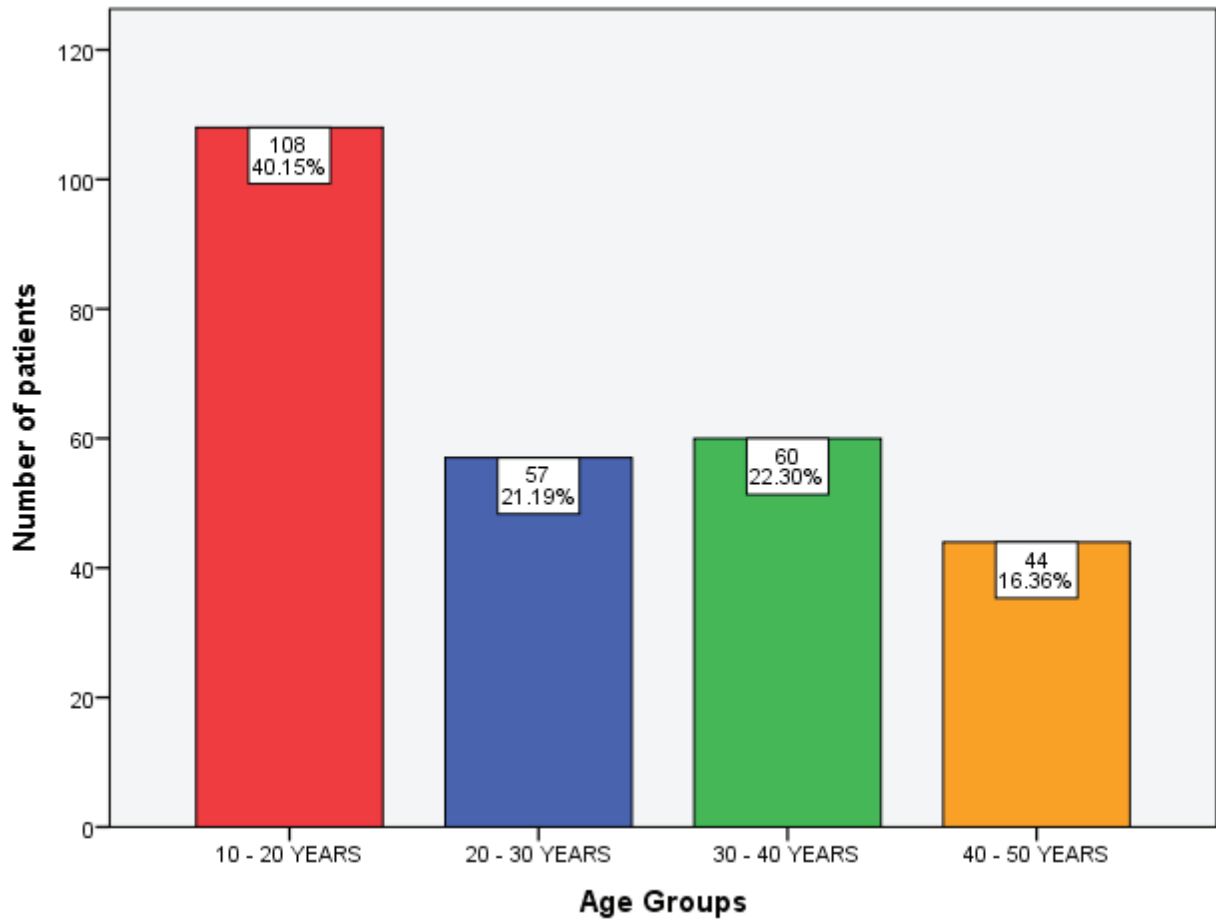


Figure 1: The bar chart depicts the distribution of study subjects based on age groups. X axis represents age and Y axis represents the number of the patient. Around 40.15% of the patients were at the age group of 10-20 years (red), 21.19% were between the age of 20-30 years (blue), 22.30% were between the age group of 30-40 years (green) and 16.36% of the patients were at the age group of 40-50 years (orange) respectively.

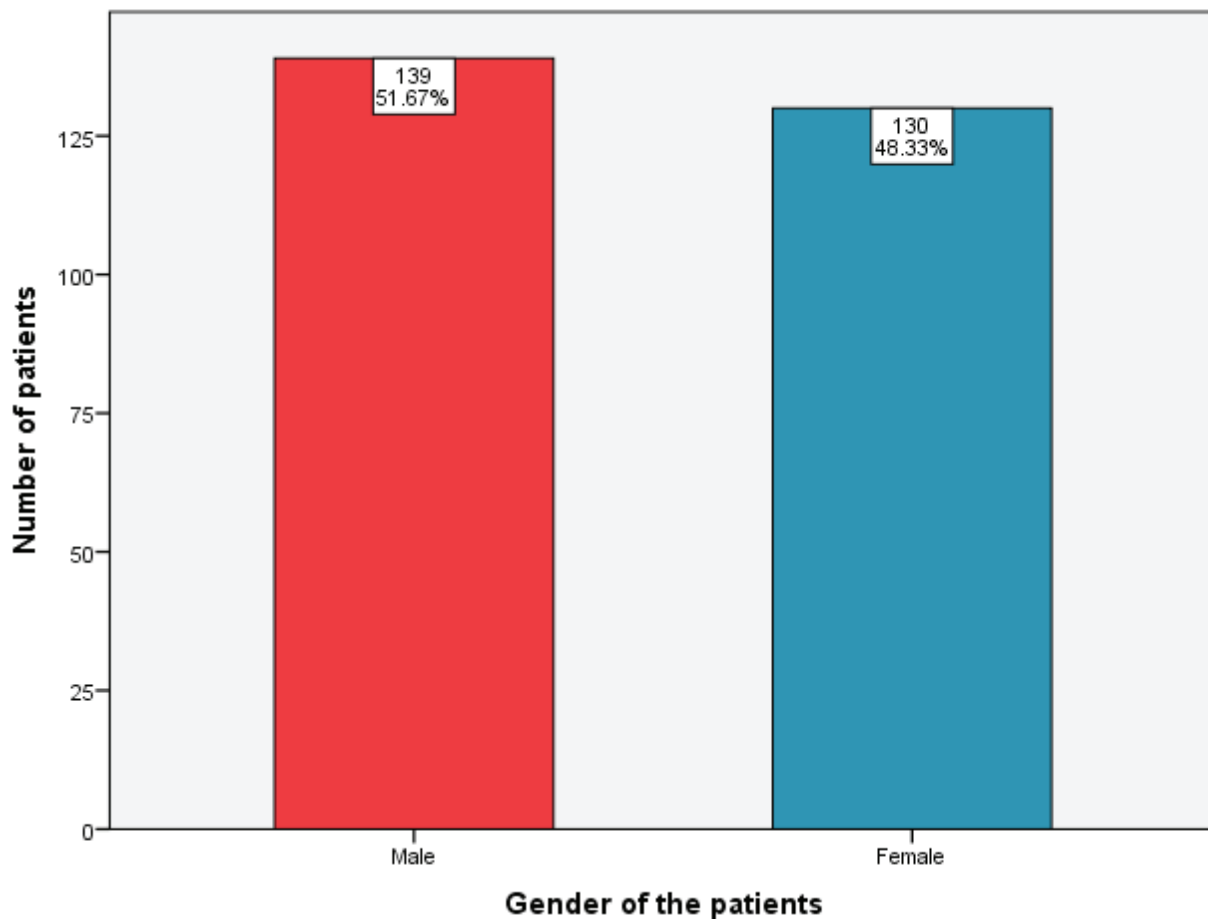


Figure 2: The bar chart depicts the distribution of study subjects based on gender. X axis represents gender and Y axis represents the number of the patient. 52% male (red) and 48% female (blue) respectively.

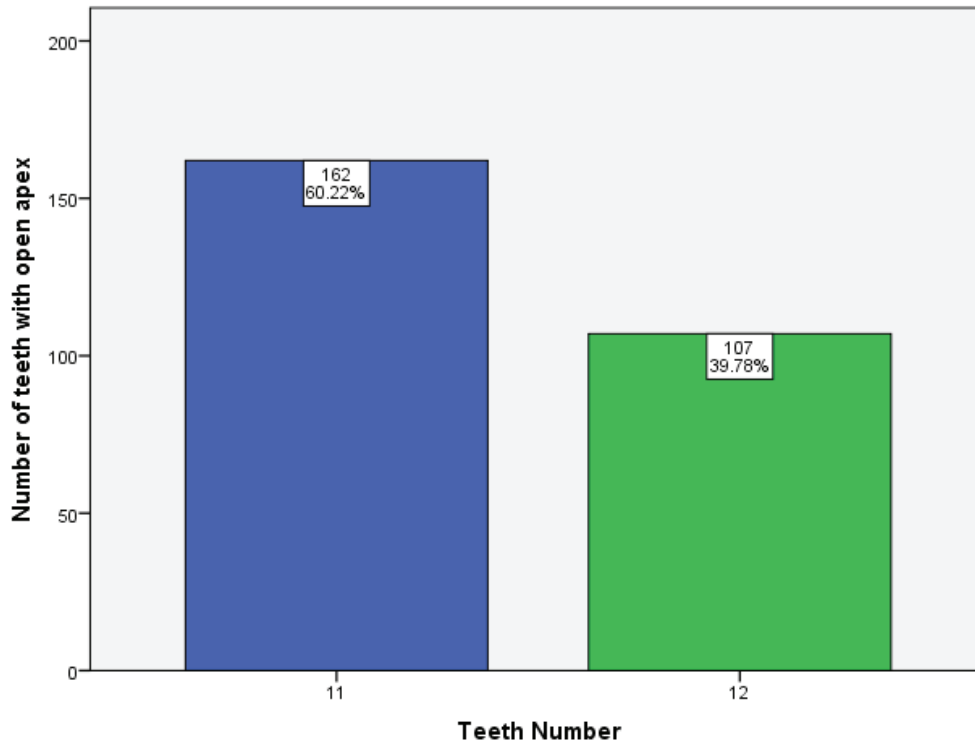


Figure 3: The bar chart depicts the distribution of teeth number which was diagnosed with open apex in Maxillary central incisors. Where the X axis represents the teeth number and Y axis represents the number of teeth with open apex. 60.2% and 39.8% reported with open apex in 11(blue) and 21(green) respectively.

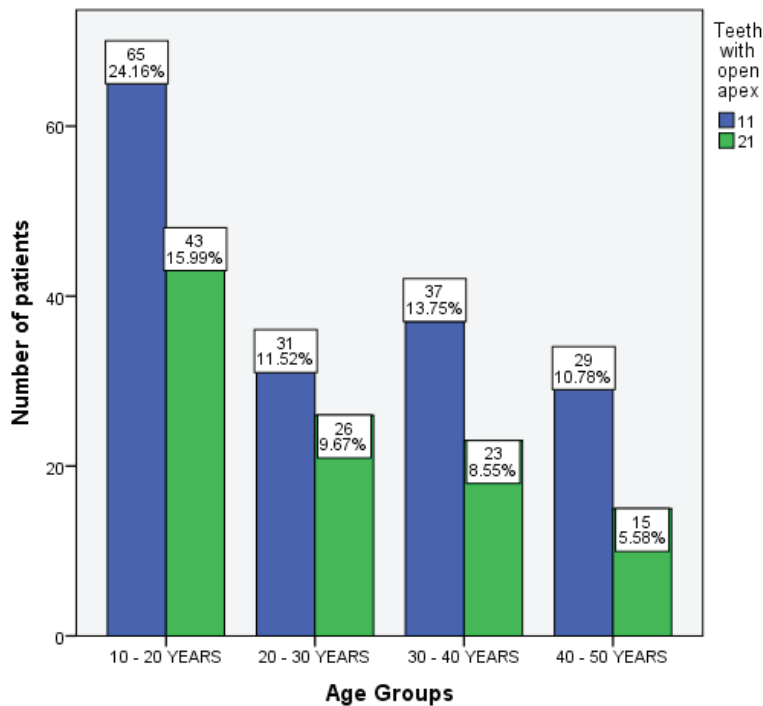


Figure 4: The Bar chart depicts the association between age groups and patients with open apex. Where the X axis represents age groups of the patient and the Y axis represents the number of patients diagnosed with open apex. Blue

denotes teeth number 11 with open apex, green denotes teeth number 21 with open apex. Majority of patients with age group 10-20 years reported a higher incidence of open apex in maxillary central incisors than other age groups. Similarly the statistical analysis also shows significant differences. [Chi square test - Pearson's Chi square value - 14.357, P Value - 0.026 (P< 0.05 which is statistically significant)].

The retrospective study analyses the association of age and gender distribution of patients reported with Open apex in maxillary central incisor. This type of study presents inherent limitations, such as limited study samples, University centric, Limited population covered and their analysis can therefore lead to biased data. Nonetheless, the obtained epidemiological information can be useful to clarify etiologic hypotheses or improve available techniques for management of these cases (20,21). Immature permanent teeth with necrotic pulps are difficult candidates for conventional root canal fillings.

Immature permanent teeth with open apex have an increased susceptibility to root fractures after treatment (22). In the past many different treatments have been proposed for immature permanent teeth with necrotic pulps. These include custom fitting of filling materials like gutta percha, paste fills into wide canals, and periapical surgeries (23).

The associated limitations of these procedures diverted interest towards therapies that aimed to induce a calcified barrier in a root with open apex or promote continued root development of an incompletely formed root in teeth with necrotic pulps (24). These interventions are termed as apexification procedures (25) and were popularised by. Calcium hydroxide was the favoured choice for these procedures. The underlying principle was removal of the necrotic pulp, followed by thorough debridement of the canal and control of infection.

Typically, the clinical and radiographic diagnosis of teeth with open apices and necrotic pulp is based on a dichotomous option (yes / no). However, the term "open apex" could not be grouped as a single entity (26). Open apices include a wide variety of cellular changes and radicular morphologies throughout all phases of root development (20). When a tooth remains more immature, it becomes more difficult to mechanically clean the pulpal space, the risk of foreign body extrusion

inside the periapical tissues increases due to the lack of apical constriction, and the presence of apical divergent anatomy (26,27).

The results of this study confirmed that the 30-50 years age group was most commonly submitted to treatment (42%) as reported by previous studies (28,29). Completely formed teeth can suffer alteration in the terminal portion of the root by pathological or iatrogenic factors and develop open apices.

Study Limitations

Very small sample size, Geographic isolation, More parameters if assessed would give a much better quality assessment.

Future Scope

Study needs to be done on large sample size, More grading samples is required and a prospective based study would help assess the long term prognosis.

Conclusion

Within the limits of this study we conclude that the age group of 10 - 20 years had been diagnosed with most number of open apices in Maxillary central incisors. Also the occurrence of open apex was more prevalent in tooth number 11 as compared to 21. More correlations can be studied by doing similar studies in larger populations and studies can be done based on geographical location and races.

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Author Contributions

Balaji. V, acquisition of data, analysis, interpretation of the data and also in drafting the article and revising it critically for important intellectual content.

Surendar Sugumaran, contributed in the concept, contributed in the study design, correction, alignment and supervision.

Sreedevi Dharman, contributed in format and alignment and final approval of the submitted version of manuscript.

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Ethical Clearance: It is taken from “Saveetha Institute Human Ethical Committee” (Ethical Approval Number- SDC/SIHEC/2020/DIASDATA/0619-0320)

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