
Prevalence of Root Caries among patients visiting a Private Dental Hospital- A Retrospective study

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Abstract: Dental root caries have received a great deal of attention in the last few years. It can occur as a Primary or Secondary lesion and diagnosis, access and treatment are different than coronal caries. Early detection of root caries may help in tooth retention for longer years. But, there have been too few studies to define its natural history, its distribution in a population and associated factors. Thus, The aim of the study was to evaluate the prevalence of root caries and their associated factors among patients visiting private dental college. The clinical records of 1911 patients with root caries were evaluated. Date of age, gender, tooth with root caries were obtained from the records of the dental hospitals. The data was analysed using SPSS software. Chi Square Test was performed to compare two proportions. The analysis was done for: age, gender, tooth with root caries in this study. The overall prevalence rate of root caries was found to be 57.9% among males and 42.1% among females. The Prevalence increased for both sexes almost consistently with age. The mean age group of occurrence of root caries was found to be 51-65 years (39.1%). The intra oral distribution pattern of root caries revealed that the most frequently affected tooth type was found to be maxillary first and second molar (19.7%) in maxillary arch. The least frequently affected tooth was the mandibular incisor (1.1%). The results of the study shows that the occurrence of root caries increases with increase in age. Hence, older adults deserve attention concerning their actual role in the epidemiology of principal oral diseases and require future caries prevention programs.

Keywords: Epidemiology, Mandibular incisors, Maxillary first and second molar, Root caries.

INTRODUCTION:

Dental practitioners often face a unique challenge of providing specialized dental care to the elderly population. India's 60 and older population is expected to encompass 323 million people by the mid 21st century. Among the oral diseases which are observed by dental practitioners in elderly, root caries is considered as a significant one. (Tan and Lo, 2014) Root caries is a soft, Progressive lesion that is found anywhere on the root surface that has lost its connective tissue attachment and is exposed to the environment involving enamel at the cemento-enamel junction. (Hazen, Chilton and Mumma, 1973) It is of two types:- Active lesion: Any root surface area that is well defined and shows yellowish or light-brown discolouration. The lesion is softened or of leathery consistency when probed with moderate pressure covered by plaque. Inactive lesions: Any root surface area that is well defined, shows dark-brownish or black. The surface is smooth and shiny and appears hard when probed. (Fejerskov et al., 1991) Fillings with Secondary caries are recurrent caries which are again classified as active/inactive. Root caries is a multifactorial disease caused by various microbiological factors. Recent studies have shown that *Streptococcus mutans*, *S.sorbium* and *Actinomyces* species are responsible for root surface caries. Zambon and Kasprzak described the pathogenesis of root caries formation. The process with colonization by acid producing bacterial plaque, which is followed by the formation of demineralized clefts in the cementum. In the next step, Gram-Positive bacteria invade the dentinal tubules, which leads to the formation of microcavities, sclerosis, crystal growth, demineralization of the dentinal tubules and destruction of organic matrix. This process may be enhanced in the presence of gingival recession. (Zambon and Kasprzak, 1995) It also has been found that root caries spread in a circumferential manner. (Katz, 1995) Clinically, the root caries appear as soft, irregularly shaped lesions, either totally confined to the root surface or also involving the enamel at the cemento-enamel junction.

Several studies showed that from 39-56% of adults had root caries [Hazen et al, 1972, Chilton et al, 1972]. (Hazen, Chilton and Mumma, 1973; Katz et al., 1982) Increased incidence of root caries among older adults may be due to the presence of periodontal disease, decreased flow of saliva, poor oral hygiene, poor oral health status [Hassan and Omar 2000]. (Hassan and Omar, 2000) The diagnosis of root caries is a problematic issue as it is not easy to distinguish the clinically accessible sound area and the carious lesion. Lesions often extend to proximal surfaces and sometimes subgingivally. Management of such lesions are quite difficult in removing the carious lesion and also to control the moisture during restorative placements. (Watanabe, 2003) Therefore, prevention of root caries is one of the crucial factors to promote oral health.

Root caries is a debilitating dental disease among older patients which results in tooth loss which has negative impact on the oral hygiene, quality of life suggesting extraordinary treatment needs. Studies show that patients who retain teeth longer have positive oral health behaviour. Previously our team had conducted numerous clinical trials (Prabakar, John, I. Arumugham, et al., 2018; Prabakar, John, I. M. Arumugham, Kumar and Sakthi, 2018b; Khatri et al., 2019; Pratha, Ashwatha Pratha and Prabakar, 2019; Mebin George Mathew et al., 2020; Samuel, Acharya and Rao, 2020), in-vitro studies (Prabakar, John and Srisakthi, 2016; Kannan et al., 2017; Kumar and Preethi, 2017; Kumar and Vijayalakshmi, 2017; Prabakar, John, I. M. Arumugham, Kumar and Sakthi, 2018a; Mohapatra et al., 2019) and systematic reviews (Leelavathi, 2019; Neralla et al., 2019; Pavithra and Jayashri, 2019) over the past 5 years. This led us to work on the current topic. Our team has rich experience in research and we have collaborated with numerous authors over various topics in the past decade (Deogade, Gupta and Ariga, 2018; Ezhilarasan, 2018; Ezhilarasan, Sokal and Najimi, 2018; Jeevanandan and Govindaraju, 2018; J et al., 2018; Menon et al., 2018; Prabakar, John, I. M. Arumugham, Kumar and Srisakthi, 2018; Rajeshkumar et al., 2018, 2019; Vishnu Prasad et al., 2018; Wahab et al., 2018; Dua et al., 2019; Duraisamy et al., 2019; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Gheena and Ezhilarasan, 2019; Malli Sureshbabu et al., 2019; Mehta et al., 2019; Panchal, Jeevanandan and Subramanian, 2019; Rajendran et al., 2019; Ramakrishnan, Dhanalakshmi and Subramanian, 2019; Sharma et al., 2019; Varghese, Ramesh and Veeraiyan, 2019; Gomathi et al., 2020; Samuel, Acharya and Rao, 2020) Thus, the present study is aimed to analyse the prevalence of root caries and their associated factors among patients visiting dental hospital.

MATERIALS AND METHODS:

A single centre retrospective study was done in an institutional setting. The ethical approval was received from the institution's ethical committee. The study involved selected patients data who were diagnosed with root caries. The necessary approvals in gaining the data were obtained from the institutional ethical committee (SDC/SIHEC/DIASDATA/0619-0320). The number of people involved in this study includes 3 i.e guide, reviewer and researcher.

Selection of Subjects:

All patients who were diagnosed with root caries from the time period of June 2019 to March 2020 were selected for this study. There were three people involved in this study (guide, reviewer, and researcher). All available data were taken into consideration and there was no sorting process.

Data Collection:

The patient's details were retrieved from the institution's patient record management software (Dental Information Archiving Software). Data regarding patients name, age, gender, presence of root caries and tooth number were taken into consideration for this study. Cross verification of the data was done with the help of photographs and radiographs. The data was manually verified, tabulated and sorted.

Inclusion Criteria:

All patients who were diagnosed with root caries in the age group of 20-80 years were taken into consideration.

Exclusion Criteria:

Patients' records that were incomplete were removed from the study. Repetitive entries were excluded as well. Patients aged less than 20 years and more than 80 years were not included in the study.

Statistical Analysis:

The tabulation of data was analysed using SPSS software. (IBM SPSS Statistics 26.0) The method of statistical analysis that was used in this study was Chi Square Test to compare two proportions. The analysis was done for: age, gender, presence of root caries and tooth number in this study.

RESULTS AND DISCUSSION:

The study included 11,911 participants with root caries. The participants ranged in the age group of 20-35 years, 36-50 years, 51-65 years and above 65 years. (Figure-1) shows that patients in the age group of 51-65 years reported with maximum number of root caries (39.1%) and patients in the age group of 20-35 years reported with the least number of root caries (11.04%). Thus, the prevalence of root caries increased for both sexes almost consistently with increase in age. (Figure-2) shows that the overall prevalence rate of root caries was found to be 57.7% among males and 42.3% among females. (Figure-3) show the association between age and type of tooth affected with root caries. Within the different age groups, the most commonly affected age group

of patients with root caries were 51-65 years with a prevalence rate of 59% in mandibular cuspids. (Figure-4) shows the association between gender and type of tooth affected with root caries. Within the gender distribution, males were commonly affected with root caries with a prevalence rate of 73% in maxillary central incisors. The Intra-oral distribution pattern of root caries revealed that the most frequently affected tooth type were maxillary second molar (19.7%) in maxillary arch and both mandibular first and second molars respectively (10.8%) in the mandibular arch. The least frequently affected teeth were the mandibular central incisors (1.1%).

Root caries has become a significant problem. We found a high proportion of root caries in our study in the age group of 51-65 years (39.1%) which is in the line with the findings of the previous studies (Stamm, Banting and Imrey, 1990; Clarkson, 1995; Gift and Atchison, 1995) who reported that the increase in root caries is limited to older patients, as they have been exposed to the long standing. Cumulative factors of poor oral hygiene, presence of periodontal disease, reduced flow of saliva as well as poor periodontal status. However, it is contradicting the finding of Hassan and Omar 2000 who found an abnormal increase of root caries in younger patients in Benghazi. (Hassan and Omar, 2000) due to poor oral hygiene and also the lack of health education and motivation. It is also found that in nearly half of patients, the root caries were underneath the existing restoration irrespective of whether they were amalgam, composite or cast restorations. This might have occurred as a result of suspect dental procedures, such as poor marginal adaptability, inadequate cleaning accessibility and maintenance of oral hygiene of the patient. (Hassan and Omar, 2000)

The Intra-oral distribution of root caries revealed that the most frequently affected tooth type were maxillary second molars (19.7%) and mandibular first and second molars in maxillary and mandibular arch respectively. The least frequently affected tooth were the mandibular central incisors (1.1%). This finding is similar to the study of Katz et al (1982) who found that the maxillary molars had the highest number of proximal root caries and the mandibular molars had highest numbers of buccal caries. (Katz et al., 1982) A Contributory factor in the susceptibility of proximal caries in the upper arch may be due to the width of interdental area. The bucco-lingual width of the upper teeth is wider than the comparable teeth of in lower arch (Lavelle, 1972). (Lavelle, 1972) The least number of occurrence of root caries were the mandibular incisors, agrees with other studies (Miles, 1963; Gustavsen, Clive and Tveit, 1988; Clarkson, 1995). However, There is a general agreement that the enamel-cementum junction is the most commonly being affected. Site of the initial lesion of root caries in both modern and historic material (Miles 1969, Lunt 1974, Corbett and More 1976). (Miles, 1963; Moore and Corbett, 1973; Lunt, 1974)

In spite of data not location specific and the limitations of clinical diagnostic procedure, our study suggests that older adults experience higher rates of root caries which provides a baseline for further studies in the South Indian population. Our institution is passionate about high quality evidence based research and has excelled in various fields ((Pc, Marimuthu and Devadoss, 2018; Ramesh et al., 2018; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Ramadurai et al., 2019; Sridharan et al., 2019; Vijayashree Priyadharsini, 2019; M. G. Mathew et al., 2020)

CONCLUSION:

The present study showed that the overall prevalence rate of root caries was found higher among males than females and the mean age group of occurrence of root caries was found to be 51-65 years. Thus, it can be concluded that the prevalence of root caries increased for both sexes almost consistently with age. Hence, preventive measures and oral health policies are very much needed focussing on the needs of the older individuals and socioeconomically deprived population to improve their quality of life. Documenting the distribution of root caries among older adults helps in preventing and/or arresting to its early stages with fluoride. Thus, helping in retaining teeth for a longer period which would instill a positive impact in life.

AUTHOR CONTRIBUTIONS

All authors discussed the results and contributed to the final manuscript. H.Firdus Fareen, Dr.Pradeep Kumar carried out the experiment. H.Firdus Fareen, DR.Pradeep Kumar wrote the manuscript with support from Sri.Rengalakshmi.

CONFLICT OF INTEREST

There are no conflicts of interest.

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GRAPHS:

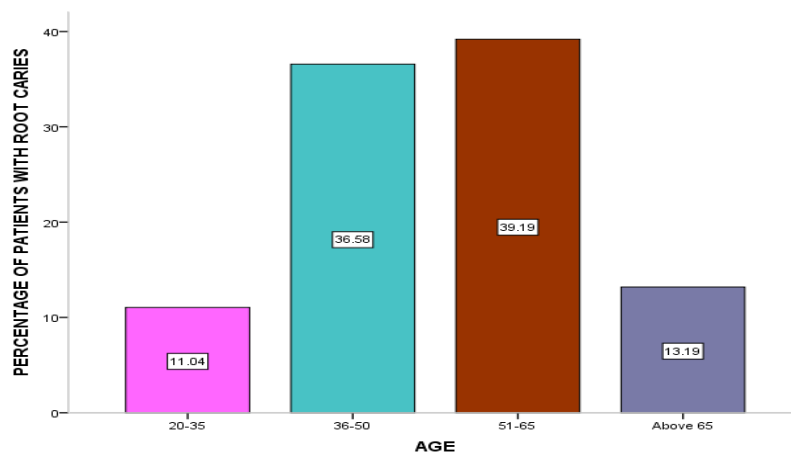


Fig.1: Bar graph representing the age wise distribution of patients affected with root caries. The X axis represents age wise distribution of patients and Y axis represents the percentage of patients with root caries. Within the different age groups, the most commonly affected age group of patients with root caries were 51-65 years (39.1% - maroon colour) and patients in the age group between 20-35 years showed the least number of root caries (11.04% - light pink colour).

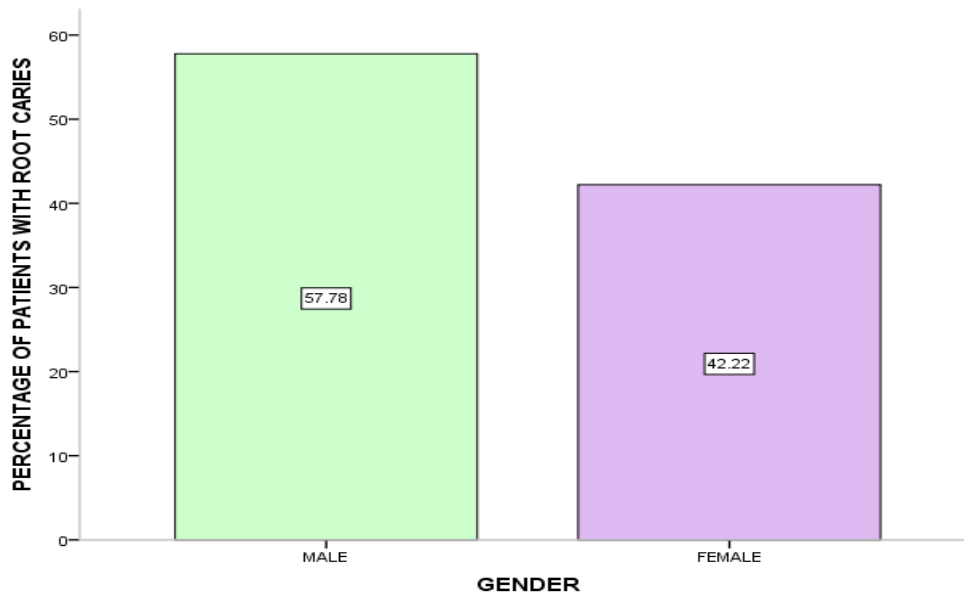


Fig.2: Bar graph represents gender wise distribution of patients affected with root caries. The X axis represents gender wise distribution of patients and Y axis represents the percentage of patients with root caries. Within the gender distribution, the overall prevalence rate of root caries was found to be more prevalent among males (57.7% - light green colour) than female patients (42.3% - light violet colour)

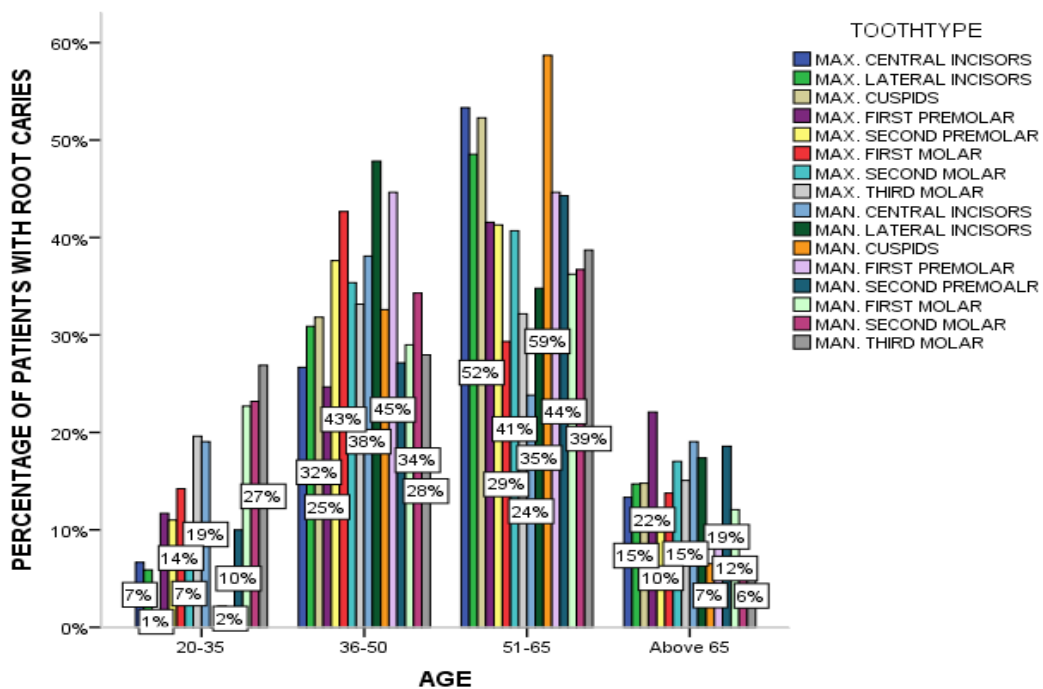


Fig.3: Bar graph represents the association between age and type of tooth affected with root caries. The X axis represents age wise distribution of patients and Y axis represents the percentage of patients with root caries. Within the different age groups, the most commonly affected age group of patients with root caries were 51-65 years with a prevalence rate of 59% in mandibular cuspids. There was a clinical significance but no statistically significant difference seen in the patients with root caries with respect to different age groups (chi square value- 15.48, p value >0.05).

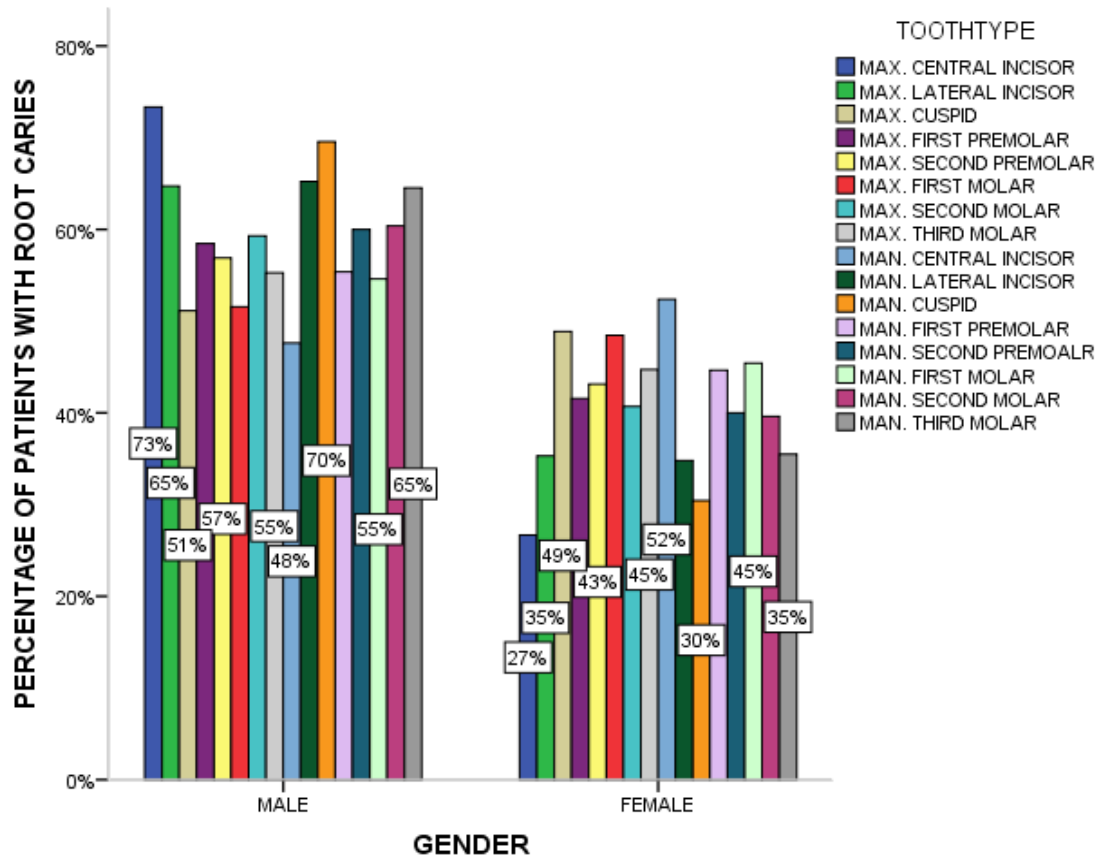


Fig.4: Bar graph represents the association between gender and type of tooth affected with root caries. The X axis represents gender wise distribution of patients and Y axis represents the percentage of patients with root caries. Within the gender distribution, males were commonly affected with root caries with a prevalence rate of 73% in maxillary central incisors. There was a clinical significance but no statistically significant difference seen in the patients with root caries with respect to different age groups (chi square value- 18.53, p value >0.05).