

Incidence of Periapical Lesions in Patients Visiting a Private Dental Institute - A Dental Hospital Based Retrospective Study

Research Article

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Abstract

Periapical lesions are caused due to progression of pulpal infection/inflammation to the periapical region. There are many causes of pulp tissue inflammation which includes dental caries, trauma, heat during cavity preparation, galvanic shock and deep restorations. The aim of this study is to assess the incidence of periapical lesions in patients attending a private dental institute. This is a retrospective study. Data was collected as 1000 intraoral periapical radiographs and were reviewed for periapical lesions from the time period of June 2019 to July 2019. The data was entered in Microsoft excel spreadsheet and subsequently transferred to SPSS Version 22 for statistical analysis. Chi square test was done to find the association between different variables. In this study, the incidence of periapical lesions among patients visiting a private dental institute is 100 per 1000 per year or 10%. Within the limits of the study, the incidence of periapical lesions was found to be considerably high among patients visiting the dental institute. Statistically significant association was seen between age and periapical lesions, age and types of periapical lesions and gender and types of periapical lesions ($p < 0.05$). The association between gender and periapical lesion was not statistically significant ($p > 0.05$) yet a female predilection was seen. This observation must be given importance and appropriate measures must be taken to curtail the rising incidence of periapical lesions.

Keywords: Periapical Lesions; Periapical Cyst; Periapical Abscess; Incidence.

Introduction

A tooth consists of 4 different and distinct layers that play a pivotal role in the maintenance of the dentition [20]. They include enamel (outermost layer), dentin (layer beneath enamel), cementum (outermost layer in the root portion) and pulp (innermost layer) [54]. The enamel is the hardest substance in the human body and is made up of 99% inorganic substances [8]. The primary mineral is hydroxyapatite which gives the enamel maximum strength [45]. Dentin is a yellowish white tissue that lies beneath the enamel layer ("Therapeutic Management of Demineralized Dentin Surfaces Using a Mineralizing Adhesive To Seal and Mineralize Dentin, Dentinal Tubules, and Odontoblast Processes", no date). It is harder than bone but softer than enamel and contains

apatite crystals of calcium and phosphate [14]. Cementum is a specialized calcified substance at the root surface [5]. It is part of the periodontium and is attached to the periodontal ligament [2-3].

The pulp is highly vascularized with a network of vessels and innervated tissue [29]. The dental pulp is compressed in a chamber surrounded by the dentin [22]. It has pulp horns and pulp canals that vary in size depending on the tooth, and a circulatory access through the apical foramen in the apex [9]. It is a defense centre for the tooth especially against dental caries [44]. Periapical diseases are mostly preceded by pulpal diseases [24].

Polymicrobial infection is commonly the cause of periapical inflammatory disease [47] and is most commonly due to dental

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caries. The infection affects the pulpal tissue and it spreads depending on the virulence of the microorganism [35]. A healthy local immune response forms granulation tissue around the apex and mounts a defense against the invading microorganisms [33]. On the contrary, a poor local immune response will lead to tissue damage, inflammation with suppuration leading to bone loss and spread of infection [37]. The common examples of periapical diseases include periapical periodontitis, periapical abscess, periapical cyst, periapical granuloma and condensing osteitis [24].

Other causes of periapical diseases include trauma, heat generated during cavity preparation, deep cavity preparation, deep restorations, micro leakage of oral fluids through faulty restorations, host immune response and galvanic shock [7 - 27]. Periapical diseases can be managed by endodontic and minor surgical treatments [1]. One of the endodontic treatments is the root canal treatment which is the most common treatment modality for periapical lesions [49]. Other techniques include decompression technique, aspiration - irrigation technique, lesion sterilization and repair therapy and calcium hydroxide method [22]. Surgical treatments are recommended for more severe cases that would lead to surgical management of the affected teeth.

Previously our team has a rich experience in working on various research projects across multiple disciplines. (Jain, 2017 [16]); (Varghese, Ramesh and Veeraiyan, 2019 [50]); (Ashok and Ganapathy, 2019 [4]); (Padavala and Sukumaran, 2018 [30]); (Ke et al., 2019 [17]); (Ezhilarasan, 2018 [10]); (Krishnan et al., 2018 [19]); (Ezhilarasan, Sokal and Najimi, 2018 [12]); (Pandian, Krishnan and Kumar, 2018 [32]); (Ramamurthy and Mg, 2018 [39]); (Gupta, Ariga and Deogade, 2018 [15]); (Vikram et al., 2017 [53]); (Paramasivam, Vijayashree Priyadharsini and Raghunandhakumar, 2020 [34]); (Palati et al., 2020 [31]); (Samuel, Acharya and Rao, 2020 [43]). Now the growing trend in this area motivated us to pursue this project.

The aim of this study is to determine the incidence of periapical lesions among patients visiting a private dental institute.

Materials And Methods

Study design:

This is a retrospective study conducted in a private dental institution. The patient case records were reviewed for the necessary information by a trained examiner. In the present study the case records used were digital Intraoral Periapical Radiographs otherwise known as Radio Visio Graphy (RVG). Among patients who have visited the dental clinic of the institution between June 2019 and July 2019, the RVGs of 1000 patients were inspected for the presence of periapical lesions. A wide age range is selected for the study. The institutional ethical committee provided approval for the study (SDC/SIHEC/2020/DIASDATA/0619-0320).

Inclusion criteria

1. Patient RVGs having periapical lesions such as periapical periodontitis, periapical abscess, periapical cyst, periapical granuloma etc.
2. Both radiolucent and radiopaque lesions.
3. Patients from < 20 years to > 60 years of age

Exclusion criteria

1. Incomplete patient data.
2. Duplicate patient data.
3. Patient RVG having periapical lesions coexisting with other radiolucent/radiopaque lesions.
4. Radiographs with errors.

Sampling

A total of 1000 RVGs of patients who visited the dental institution were inspected for periapical lesions and the RVGs are randomly selected with no specificity to any tooth or region. Convenient sampling method was used to select the patient RVGs for the study. The data was obtained from the archives of the radiology department and were cross verified with patient case records.

Data collection

All the data after thorough checking for duplicates, incomplete entries and cross verification with patient case records were entered in Microsoft excel spreadsheet in order to organise the data. The variables obtained from the data included age, gender, periapical lesions, different types of periapical lesions. Here the age and gender were the independent variables and the periapical lesions were the dependent variable.

Statistics

The statistical analysis of the obtained data was performed by the SPSS software version 23.0. The data from the excel spreadsheet was transferred to SPSS software for analysis. Chi square tests were employed in order to find the association between different variables and p value < 5% was considered to be statistically significant. The final results are presented in the form of graphs for further interpretation and discussion.

Results & Discussion

Among the 1000 RVGs inspected for periapical lesions, 100 RVGs had the presence of periapical lesions. Hence the incidence of the periapical lesions of the patients visiting the dental institute is 100 per 1000 per year or 10%. This incidence rate is considerably higher and shows a significant amount of patients suffering from periapical lesions. In contrast to the present study, Gesi A et al has found a slightly higher incidence of 16% [13] in their study and the reason for the variation might be due to sample size.

Among the 1000 patient RVGs, 2.80% of males and 7.20% of females had the presence of periapical lesions [figure 1]. The graph shows a female predilection for periapical lesions and the chi square analysis revealed that the association between the gender and periapical lesions were not statistically significant (p value - 0.09; p > 0.05). In contrast to the present study, Marmary Y et al [23] found that there was no predilection for either gender. The sampling method might be the reason behind the observation of sex predilection of the study by Marmary Y et al.

The distribution of periapical lesions across different age groups for male and female patients were studied. The maximum number

Figure 1 represents the association between gender and the presence (pink) and absence (maroon) of periapical lesions. X-axis represents gender and Y-axis represents the total number of patients. About 28 male patients (2.8%) and 72 female patients (7.2%) out of 1000 patients had periapical lesions. However, this was statistically not significant (p-value = 0.09 >0.05).

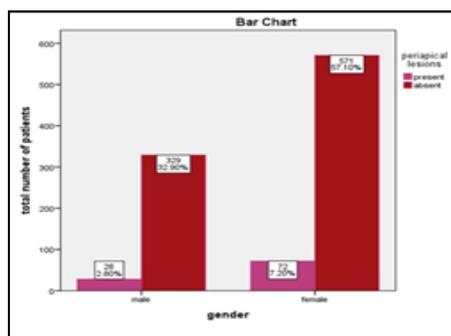


Figure 2 represents the association between age and periapical lesions among males (orange) and females (red). X-axis represents age and the Y-axis represents the number of patients with periapical lesions. The female patients (19%) and male patients (16%) between age groups 21-30 is more common compared to female patients (1%) and male patients (4%) of age group less than 20. The maximum patients are seen in the age group 21-30 years. This is statistically significant (p-value = 0.036 <0.05).

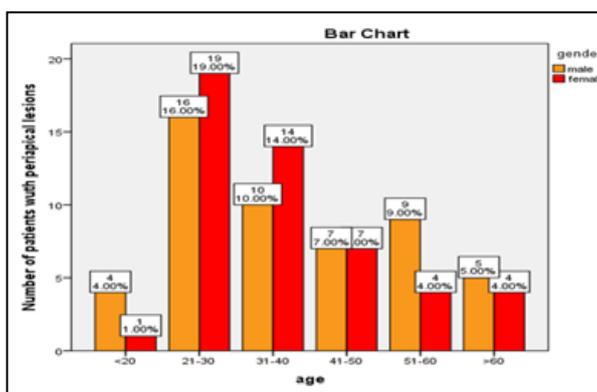
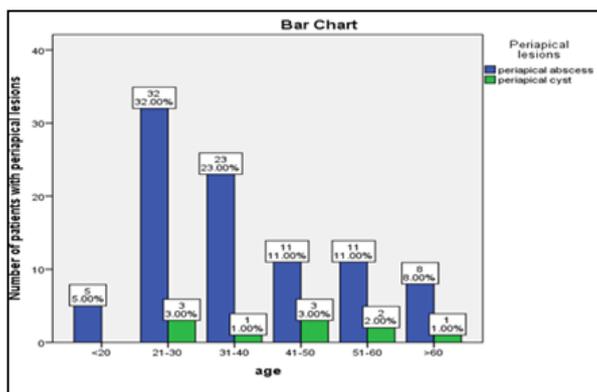


Figure 3 represents the association between age and types of periapical lesions (periapical abscess - blue; periapical cyst - green). X-axis represents age and Y-axis represents the number of patients with periapical lesions. Periapical abscess is the most common between age groups 21-30 (32%) and least common among patients of age less than 20 (5%). The association between age and type of periapical lesions were statistically significant (p-value = 0.036 <0.05).

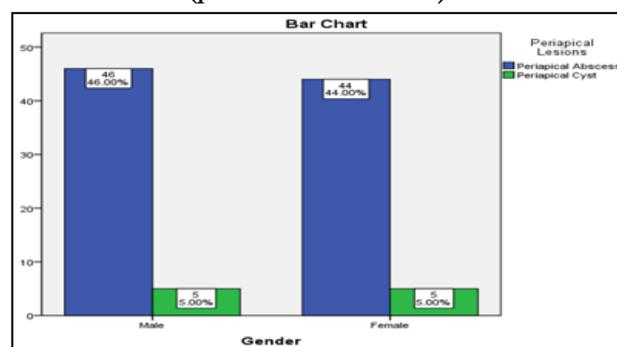


of periapical lesions were seen in the age group 21 - 30 years with a female predilection of 19% and males were 16%. Male predilection was 4%, 9% and 5% seen in age groups < 20 years, 51 - 60 years and > 60 years respectively. Males and females were equally distributed as 7% in the 41 - 50 age group [figure 2]. The association between age groups and periapical lesions were statistically significant (p value - 0.036; p < 0.05). Marmary Y et al. [23] found that about 44% of patients belonged to 20 - 29 years which is in accordance with our study. In a study by Pandolfo L et al, there was no significant association between age and periapical lesions [33] this was in contrast to the present study and the sample size

and geographical location may have caused this difference in the observation.

The different types of periapical lesions across different age groups were studied. The only periapical lesions seen were periapical abscess and periapical cyst. Periapical abscess was highest in patients of age group 21- 30 years which was 32% followed by 23% in 31 - 40 years and an equal distribution of 11% in age groups 41 - 50 and 51 - 60 years and the least amount of lesion was found in < 20 years with 5%. Periapical cyst was present at a maximum of 3% and equally in the age groups 21 - 30 and 41 - 50

Figure 4 represents the association between gender and type of periapical lesions (periapical abscess - blue; periapical cyst - green). X-axis represents gender and Y-axis represents number of patients with periapical lesions. Periapical abscess is most commonly seen in male patients (46%) and least in female patients (44%), while periapical cyst is common in both male and female patients (5%). The association between gender and type of periapical lesions. was statistically significant (p -value = 0.022 < 0.05).



years. It was least present in the > 60 years age group and was 1% [figure 3]. The finding of periapical abscess being the most common lesion is in accordance with the study done by Nair PNR et al. [28] where he demonstrated 35% of periapical abscess and 15% of periapical cysts.

The different types of periapical lesions across different genders were studied. It was seen that periapical abscess was the predominant lesion with a male predilection of 46% and a slightly lesser occurrence of 44% in females. Periapical cyst was 5% and was equally distributed in males and females [figure 4]. A study conducted by Muthanandham S et al. [26], concluded that periapical cyst was more common in the female population. This observation was in contrast to the present study and it may be due to the difference in the characteristics of the sample.

Our institution is passionate about high quality evidence based research and has excelled in various fields (Pc, Marimuthu and Devadoss, 2018 [36]; Ramesh et al., 2018 [40]; Vijayashree Priyadharsini, Smiline Girija and Paramasivam, 2018 [52]; Ezhilarasan, Apoorva and Ashok Vardhan, 2019 [11]; Ramadurai et al., 2019 [38]; Sridharan et al., 2019 [46]; Vijayashree Priyadharsini, 2019 [51]; Chandrasekar et al., 2020 [6]; Mathew et al., 2020 [25]; R et al., 2020 [41]; Samuel, 2021 [42]). We hope this study adds to this rich legacy.

The limitations of this study include a small sample size and therefore cannot be generalized to a larger population. Future scope of the study can include prospective study design with a larger sample size and other variables such as distribution of periapical lesions according to teeth and the etiological factors behind the periapical lesions can also be assessed.

Conclusion

From the present study it is apparent that the incidence of periapical lesions is considerably high in patients visiting the dental institute. A female predilection was seen even though the association between gender and periapical lesion was not statistically significant. The most commonly affected age group was 21 - 30 years. Patients should be educated and made aware about the importance of periodic dental check ups which can help in preventing the progression of dental caries into a periapical lesion. On the other hand careful and proper treatment planning for teeth

with dental caries can eliminate the occurrence of periapical lesions due to iatrogenic reasons.

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