

RADIOGRAPHIC EVALUATION OF PERIAPICAL STATUS OF ENDODONTICALLY TREATED AND NON TREATED TEETH IN INDIAN POPULATION – A CROSS SECTIONAL STUDY

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Abstract

Background: - The purpose of this cross-sectional study was to evaluate clinico-radiographically the prevalence of Apical Periodontitis (AP) in non- treated & endodontically treated teeth in general population of Moradabad.

Methods : - A total of 503 new patients, aged 25-50 years, from Department of Oral Medicine & Radiology, Teerthanker Mahaveer Dental College & Research Centre, Moradabad, Uttar Pradesh, were examined. All participants underwent Orthopantomograph (OPG) followed by Intra Oral Periapical Radiograph (IOPAR) of the diseased teeth. Periapical status of diseased teeth was assessed, using Peri Apical Index (PAI). Results were analysed statistically using the Chi-square test.

Results: - Out of 503 patients examined, 448 patients were non-treated and only 55 patients were endodontically treated. Amongst 503 patients a total of 13,414 teeth were examined of which 1159 (8.64%) teeth were diseased. Out of 1159 diseased teeth, 1084 teeth (93.52%) were non-treated & 75 teeth (6.47%) were endodontically treated. Amongst non- treated teeth, AP was seen in 732 teeth (67.52%). Amongst endodontically treated teeth, AP was seen in 39 teeth (52%). According to age, AP was more in patients of age group between 41-50years in both non-treated (64.89%) and endodontically treated patients (71.42%).

Conclusion: - This study discloses the fact that the prevalence of AP in India is more as compared to other populations across the world. More number of patients had untreated teeth with AP. Apical Periodontitis is more commonly seen in older age group (41-50years) as compared to younger age group in both non- treated and treated groups.

Keywords: - Apical periodontitis, Periapical Index, Endodontically treated and non-treated Teeth.

Introduction

AP is an inflammatory disorder of periradicular tissues caused by persistent microbial infection of the root canal system of the affected tooth. It can be classified on the basis of etiology, signs, symptoms, radiographically, and so on as Acute or Chronic. Acute apical periodontitis is painful inflammation of the periodontium as a result of trauma, irritation, or infection through the root canal, regardless of whether the pulp is vital or non-vital. Chronic apical periodontitis is inflammation and destruction of apical periodontium that is of pulpal origin, appears as an apical radiolucent area, and does not produce clinical symptoms. Chronic lesion can remain “dormant” and symptomless for long periods without major changes in the radiographic status. However, at any time the delicate equilibrium prevailing at the periapex can be disturbed that may favour the microbes in the root canal.¹ The microbes advance into the periapex and the lesion spontaneously becomes acute with recurrence of symptoms (exacerbating apical periodontitis, phoenix abscess). As a result, microorganisms can be found extraradicularly during these acute episodes with possibly rapid enlargement of the radiolucent area. This characteristic radiographic feature is the result of apical bone resorption that occurs rapidly during the acute phases, with relative inactivity during the chronic periods. The disease therefore does not progress continuously.²

Epidemiological investigations have demonstrated a high prevalence of AP in many western countries. Prevalence from 30-60% and increasing with age are commonly reported from Dutch, Portugal, Switzerland, United States and other countries.³⁻¹¹ Data reported from Scandinavia

shows the prevalence of AP in root-filled teeth ranging from 16 to 52.2%.^{3, 5, 12-18} But this may vary from population to population depending upon the awareness about root canal treatment. Also epidemiologic investigations have demonstrated that the success rate of endodontic treatment performed by general practitioners is modest, with average figures around 70%⁶ while endodontists and teaching institutions frequently achieve 90% success.¹² In some populations with regular dental care habits and restorative attitude among dentists and patients, a majority of apical periodontal lesions are found in connection with already root filled teeth.^{13, 14} However in some other population where only a minority seek regular dental care and with endodontic treatment routines less than 20% of apical periodontal lesions were found in connection with root-filled teeth.⁶ Recent studies have shown that although root canal treatment is often performed, much periapical radiolucency go undetected.^{15,19-23.}

Criteria for AP vary amongst authors, some stated widening of the periodontal ligament space (PDL) and periapical radiolucency^{3, 7, 14} others stated loss of lamina dura and periapical radiolucency, and yet others used PAI score 3, 4 and 5.^{6, 12} The use of visual references in the PAI deemphasized the importance of the observer, since no clinical judgment is permitted in the assessment of AP. This result in a higher reproducibility in the radiographic scores, and different studies can more easily be compared.^{15, 24}

Information about the prevalence and technical standard of endodontic treatment and the occurrence of periapical lesions in Indian population is lacking. Hence, the present cross-sectional study was undertaken for clinico-radiographic evaluation of periapical status, prevalence of

AP in endodontically treated and non-treated teeth in a general Indian population of Moradabad district. OPG supplemented with IOPA were used for the evaluation due to the fact that all teeth can be seen on one radiograph, the relatively low patient radiation dose and the convenience and the speed with which these kinds of radiographs can be made, are advantageous when compared with full mouth sets of periapical radiographs.

Materials & Methods

Patient selection

A total of 503 subjects, aged 25-50 years, presenting as new patients to the department of Oral Medicine & Radiology, Teerthanker Mahaveer Dental College & Reaserch Centre, Moradabad, Uttar Pradesh, were selected. Simple random sampling method was used in order to get information about prevalence of apical periodontitis in endodontically treated and non-treated teeth.

Inclusion criteria

- Patient who volunteered for the study.
- Patients between 25 years to 50 years of age.
- Third molars were excluded.
- Patient attending the out-patient department (OPD) for the first time

Exclusion criteria

- Third molars
- Patients having less than 7 remaining teeth

Clinical examination

The Clinical examination of 503 patients involved quadrant-wise sequential clinical examination and assessment of teeth beginning from right maxillary 2nd molar to left maxillary 2nd molar and left mandibular 2nd molar to right mandibular 2nd molar. Compressed air was used to dry teeth and to remove debris in order to allow better visual examination. All exposed and accessible surface were examined for caries, trauma, and fracture, coronal fillings in proximal and occlusal surfaces of teeth. Vitality of suspected teeth was examined using pulp tester. All the information was recorded on a structured form for each subject.

When the case was selected, an informed consent was taken from all the patients involved in the study for full-mouth radiographic survey by using OPG and IOPA of involved teeth.

Radiographic examination

A full mouth radiographic survey with OPG was done to evaluate generalized periapical status of teeth. IOPAR were exposed for affected teeth with caries, trauma, coronal and endodontic restorations etc selected from OPG (Figure 1 & 2)

Evaluation criteria of AP

To identify teeth with AP, the PAI was used (Figure 3). The index consists of five categories, each representing a step on an ordinal scale from sound periapical bone to severe AP (Ørstavik *et al.* 1986). A tooth assigned grade 1 or 2 was diagnosed healthy, whereas if the grade 3, 4 or 5 were diagnosed as diseased, having AP. For teeth with more than one root, the highest score of all the roots was allotted to the tooth. The status of each tooth was recorded as “non-root filled” and “root filled”.

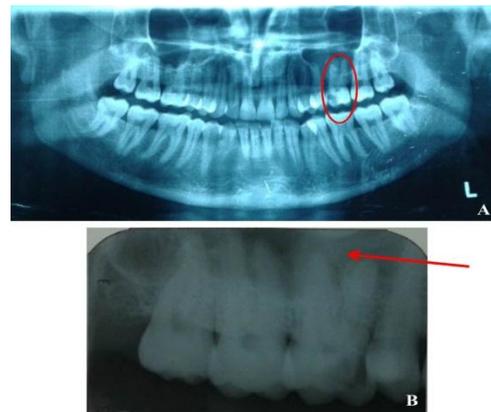


Figure 1: - OPG and IOPR of non-treated group



Figure 2: - OPG and IOPR of treated group

1	2	3	4	5
Normal Periapical Structures	Small changes in bone structure	Changes in bone structure with some mineral loss	Periodontics with well-defined radiolucent area	Severe periodontics exacerbating features

Figure 3: - PAI Index

Statistical analysis

The data was tabulated on Microsoft excel depicting name of the patient, treated or non-treated group, age, sex, total number teeth present, oral hygiene status, caries, restorations, presence or absence of periodontal pocket, history of trauma, number of visits to the dentist in the past, presence or absence of pain, presence or absence of sinus, and the results were subjected to statistical analysis using Chi square test.

Results

Out of 503 patients, AP was seen in 275 (54.67%) patients. Out of these 275 patients, AP was seen in 238 non-treated patients & 37 treated patients. (Table-1)

	Non-treated	Endo treated	Total
No. of patients	448	55	503
No. of patients without AP (score 1-2)	210 (46.87%)	18 (32.72%)	228 (45.32%)
No. of patients with AP (score 3-5)	238 (53.12%)	37 (67.27%)	275 (54.67%)
Chi Square test ; p = 0.047 ; Significant			

Table 1: - Apical periodontitis in total number of patients examined

Out of 1,159 teeth examined, 1084 were non-treated & only 75 teeth were endodontically treated. Out of 1,084 non-endodontically treated teeth, AP was seen in 732 teeth (67.52%). Out of 75 endodontically treated teeth, AP was seen in 39 teeth (52%). (Table- 2)

According to age, AP was more in patients in age group between 41-50 yrs in both non – treated (64.89%) and endodontically treated group (71.42%) (Table-3)

According to age, AP was more in patients in age group between 41-50 yrs in both non – treated (64.89%) and endodontically treated group (71.42%) (Table-3)

	Non-treated	Endo treated	Total
No. of teeth	1084	75	1159
No. of teeth without AP (score 1-2)	352 (32.47%)	36 (48%)	388 (33.47%)
No. of teeth with AP (score 3-5)	732 (67.52%)	39 (52%)	771 (66.52%)
Chi Sq Test ; p = 0.006 Significant			

Table 2: - Apical periodontitis in total number of teeth examined

Age Gp	Non-treated		Total	Endo treated		Total
	Score 1-2	Score 3-5		Score 1-2	Score 3-5	
25-30yr (263)	99 (42.67%)	133 (57.32%)	232	10(32.25%)	21 (67.74%)	31
31-40yr (139)	64 (52.45%)	58 (47.54%)	122	6 (35.29%)	11(64.70%)	17
41-50yr (101)	33(35.10%)	61(64.89%)	94	02(28.57%)	05(71.42%)	07
Total -503	Chi Square Test p=0.035 Significant			Chi Sq Test ; p = 0.947 Not significant		

Table 3:- Distribution of Apical Periodontitis according to age of the patients examined

PAI grade-5 was found maximum (55.73%) in Non-treated teeth, whereas grade-3 was found maximum (61.53%) in root-filled teeth. (Table- 4)

	PAI 3	PAI 4	PAI 5	Total
Non-treated	257 (35.10%)	67 (9.15%)	408 (55.73%)	732
Root-filled	24 (61.53%)	11 (28.20%)	04 (10.25%)	39
Total	281 (36.44%)	78 (10.11%)	412 (53.43%)	771

Table 4:- Periapical Index grades in teeth with AP according to endodontic status

Discussion

Epidemiological surveys from different parts of the world demonstrate that AP certainly is a common disease in the adult population. However, data on the prevalence of AP vary between populations and countries and depend on differences in caries prevalence, access to dental care and methodological issues such as measurement and sampling variation.

Methodological problem in the study of AP in epidemiological studies was that radiograph was only diagnostic tool. The periapical radiolucency may represent other conditions than AP, because one will have no knowledge of the histological diagnosis²⁵. Moreover, the PAI used for scoring periapical status was first described for periapical radiographs (orstavik 1986). In this study, the PAI was used to assess the periapical status because most of the studies on the prevalence of AP have used this index scoring to assess the periapical status and hence the results of this study can be more appropriately compared with them^{3,12}.

The study material used in this survey consisted of patients attending the Department of Oral Medicine and Radiology,

Teerthanker Mahaveer Dental College and Research Centre, Moradabad, U.P. and this was a convenient and inexpensive way to gather a sample, and the radiographic examination may have to be performed for clinical reasons. Number of dental visits of non-treated patients was noted less, that is one or two, whereas for endodontically treated patients was four to six. Out of 503 patients examined, only 55 were endodontically treated cases. This may be due to lack of education and low socio-economic status of the local population. Patients coming for first time in dental office were examined as fresh data could be obtained and patients were not unnecessary exposed to radiations. Patients volunteered were those only who were interested in knowing their status of teeth. Age group of 25-50 years was most suitable for the present study as teeth are fully developed and occlusion is well established. As patients are already exposed to life cycle, they do have more possibility of trauma, caries, and physiologic attrition.

Third molars were not included in present study because of variation in morphology and eruption pattern. Sometimes they are either impacted or missing. Patients with less than seven remaining teeth were excluded because they often had periodontal disease and it was impossible to determine the role played by the endodontic treatment in the occurrence of a radiographic lesion.

Initial OPG radiographs were preferred instead of full mouth periapical radiographs because many periapical lesions could be detected at one instance. This also reduced the exposure to radiation & wastage of films and time. But by using only OPG, an underestimation of lesions occurred so later IOPAR of only diseased teeth were exposed. Periapical radiography on conventional films was used in the study because not only the presence, but also the degree of AP was assessed and conventional films gave better results. Diseased tooth can be centered on a conventional IOPAR & AP can be evaluated using PAI score.

Out of 503 patients examined, 275 patients (54.67%) were having AP. (Table-1) In these 275 patients, 238 patients (53.12%) were non-treated and 37 patients (67.27%) were endodontically treated. Non-treated patients with AP were more as compared to endodontically treated patients due to lack of awareness and economy. Thus only minority seek regular dental care and endodontic treatment. These results are different from other studies¹²⁻¹⁴. The difference in these studies may be due to the difference in health care services in the respective countries. The awareness of root canal treatment and the cost of the treatment in the respective countries play a role in choosing between extraction and root canal treatment.

According to distribution of teeth, non-treated teeth with AP were 67.52% as compared to endodontically treated teeth with AP. (Table-2) This indicates that a large part of the patient population examined had a substantial need for endodontic treatment. These findings are concurrent to the results of the study by Petersson *et al*, who found that the patients in their study retained a significant need for endodontic treatment.

The age range of the studied population was between 25-50 years. (Table-3) But more number of patients was between 25-30 years which make up almost (52.28%) of the patients sample. The reason for this may be that most of the patients come only for alleviation of pain. AP was more common in older age group (41-50 years) as compared to younger age group (25-40years). This is due to the fact that older individuals tend to have a higher prevalence of AP in endodontically treated teeth than younger individuals. This could be expected because of longer exposure time to dental disease, various dental treatment and attrition-all factors which increase the risk of pulpal damage and infection.

In this study, 36.44% of teeth had PAI score of 3; 10.11% had PAI score of 4 and 53.43% of teeth had PAI score of 5 respectively. (Table-4)

The results of the present study indicate that there is a need for endodontic treatment in the population examined. Regular dental visits are not observed due to which asymptomatic diseases such as chronic AP goes undetected. They were also detected in routine radiographs during the study. The reason behind this kind of inscience is lack of awareness amongst the population. Moreover, many root canal treatments performed in the past seem to be failing. This may be suggestive of the use of improper endodontic techniques and procedures. Further emphasis in the dental curriculum should be given to clinical endodontics, and referral of difficult cases to dentists with advanced knowledge and training in endodontics should be made possible for the benefit of the patient.

Conclusion

The cross-sectional study was conducted to evaluate periapical status, prevalence of AP in endodontically treated and non-treated teeth in a general population of Moradabad. Based on the results following conclusion was drawn:-

- AP is more prevalent in this region.
- Non-treated cases with AP are more prevalent as compared to endodontically treated.
- AP is more commonly seen in older age group (41-50 years) as compared to younger age group in both treated and non-treated groups.

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