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RESEARCH ARTICLE

Clinical and Radiographic Evaluation Of each Variant Of Periapical Pathology:A Random Population Study.

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Abstract

Objectives To find out the accurate prevalence of periapical pathology and to see the significance of the clinical signs in diagnosing each variant of periapical pathology.

Method-A study of 300 patients were chosen consecutively who visited the department of oral radiology for intra oral periapical radiographs. The clinical data of all the variants of periapical pathology were registered in a specific clinical form followed by intra oral periapical radiographs of the same site.

Results -A total of 235 radiographs were diagnosed with periapical pathology. Periapical rarefying osteitis was present in almost every second radiograph (32.13%) and less common were periapical cysts (3.16%). No sex predilection was found in distribution of periapical pathology ($p=0.768$) and majority of the patients (26.39 %) belonged to the 25 to 36 years age group ($p=0.008$). Mandibular molars (39.61%) were most common and mandibular canines (0.82%) were least common sites to be involved with periapical pathology ($p=0.002$). Overall significance of the clinical signs in diagnosing each variant of periapical pathology was observed ($p=0.006$).

Conclusion- Our results suggested high prevalence rate of periapical pathology. This study also elaborates all the clinical signs of periapical pathology and their statistical significance in diagnosing each variant of periapical pathology.

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Introduction:-

Apical periodontium is involved in peri radicular pathologies. Accurate diagnosis can be made by using intraoral periapical radiography. Radiography is an important diagnostic tool in dentistry. All inflammatory conditions of bone, regardless of the specific etiology are considered to represent a spectrum or continuum of conditions with different clinical features. When the initial source of inflammation is necrotic pulp and the bone lesion is restricted to the region of the tooth, the condition is called a periapical inflammatory lesion. Radiographic changes occur due to mediators of inflammation, ie, cytokines, prostaglandins and many growth factors. This tips the balance to favour either bone resorption or bone formation which can be accurately diagnosed by intraoral periapical radiograph. This study is done to correlate clinical signs with radiographic features. The commonest features in the clinical signs are: pulp involvement, tooth discoloration, erythema of alveolar mucosa, intraoral swelling, extraoral swelling and vestibular tenderness and sinus tract opening. The radiographic features elaborated in our study are widening of periodontal ligament space, thickening of lamina dura, rarefying osteitis, condensing osteitis, periapical cyst and mixed radiolucent radioopaque appearance. By elaborating and correlating radiographic and clinical features we can avoid complications caused by periapical pathologies. Clinician can achieve diagnosis in the initial stage. Hence, this study helps us to know signs and symptoms to diagnose periapical pathologies with statistical analysis in a large study population.¹

Materials and methods:-

Materials used:

- No:2 Intraoral periapical radiographs of patients randomly selected from the department (KODAK E-speed films)
- Checklist for evaluation of clinical signs
- Film holding device- Snap-A-Ray
- Conventional intra-oral radiographic machine

Checklist for clinical signs

Clinical signs	Yes	No
Pulp involvement		
Tooth colour		
Tooth surface involved		
Erythema of alveolar mucosa		
Intra oral swelling		
Extra oral swelling		
Tenderness on percussion		
Vestibular tenderness		
Sinus tract opening		

Checklist for radiographic features

Radiographic features	Yes	No
Widening of pdl		
Thickening of lamina dura		
Rarefying osteitis		
Condensing osteitis		
Periapical granuloma		
Periapical cyst		
Both rarefying and condensing osteitis		

Methodology:-

A total of 235 subjects were selected randomly from the outpatient department from August to October in the year 2014 in the Department of Oral Medicine and Radiology of V.S Dental College and Hospital Bangalore. A study population was selected randomly for the study. With the patient's informed consent, examination of the oral cavity was performed by visual inspection and palpation of teeth and its periapical regions. The clinical data was registered in specific clinical form. Patient age, gender, pulpal involvement, tooth color/contour, erythema at root apex, extra oral and intraoral swelling, extraoral and intraoral swelling ,extraoral/ intraoral sinus tract, tenderness on percussion of tooth ,tenderness on palpation at tooth apex and vitality of the tooth were made note of Intra oral periapical radiograph of the sites with periapical pathologies were taken using bisecting angle technique in Confident Conventional radiographic unit (70kvp, 8mA and 12 inch cone). No 2 intraoral periapical films (Kodak E speed films ,Eastman Kodak ,Rochester, USA) and films holding instruments (snap-A ray) were used for the same. The radiographs were interpreted together by two radiologists and one endodontist by modifying the criteria given by Yitzhak Marmary.³ Radiographic diagnosis of widening of periodontal ligament space, periapical granuloma, infected periapical cyst were included in criteria and in the check list for each patient. All the data were entered into Microsoft excel and analyzed using chi –square test, setting value of $p < 0.05$ for the prevalence and distribution of periapical pathology and z test, setting a value of $p < 0.05$ to see the significance of the clinical signs in diagnosing each variant of periapical pathology.

Results:-

In total, 235 intra oral periapical radiographs were diagnosed with periapical pathology, giving prevalence of 78.3%. Rarefying osteitis was most prevalent and almost present in every second radiograph³ (41.27%) followed by widening of periodontal ligament space (15.8%), condensing osteitis (14.55%), periapical granulomas (9.2%) both rarefying and condensing osteitis (6.68%) and less prevalent were periapical cyst and infected periapical cyst (6.3%) as shown in table 1.

Table 1: Distribution of 300 periapical pathologies evaluated by radiographic examination

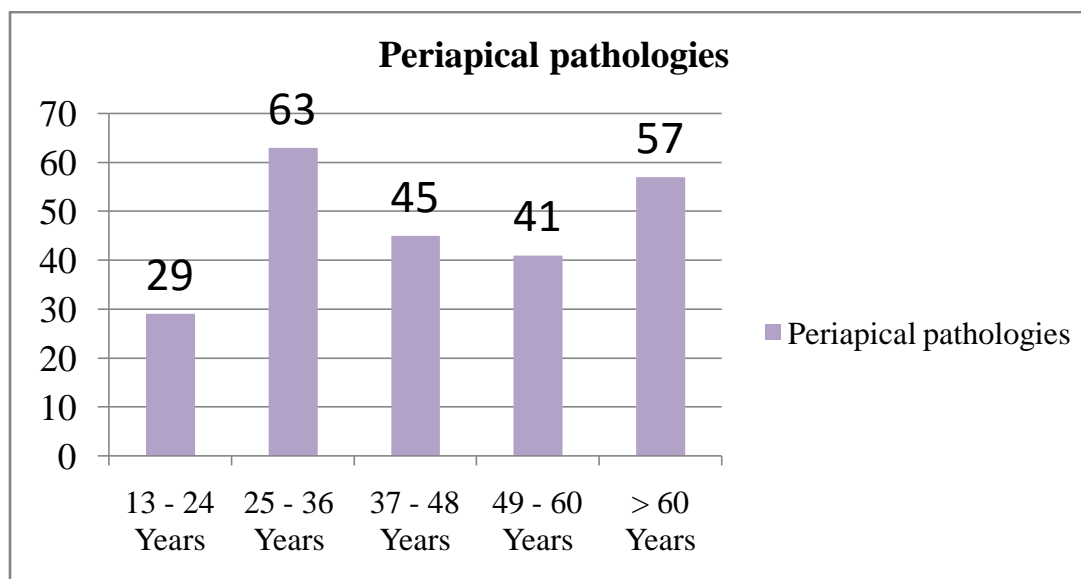
Lesions	N	%
Widening of periodontal ligament space	41	15.8%
Rarefying osteitis	76	41.27%
Periapical granuloma	30	9.2%
Periapical cyst	8	6.3%
Infected periapical cyst	15	6.3%
Condensing osteitis	49	14.55%
Both Rarefying and Condensing osteitis	16	6.68%

Table 2 and graph 1 represents the age wise distribution of periapical pathologies where maximum were seen between 25-36 years (26.39%) followed by 60 years and above (24.25%), (19.1%) in age group of 37-48 years and age group of patients between 49-60 years had prevalence of periapical pathology of 17.4% and the age group of 13-24 years, the prevalence rate was 12.3%.

Table 2: Distribution of 300 periapical pathologies evaluated by clinical examination according to the age group

Age group	Periapical pathologies
13-24	12.3%
25-36	26.39%
37-48	19.1%
49-60	17.4%
>60	24.25%

Graph 1: Distribution of 300 periapical pathologies evaluated by clinical examination according to age group



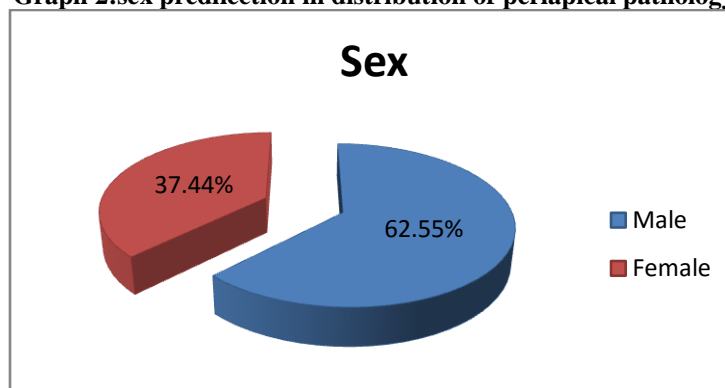
The majority of the patients (26.39%) belonged to 25 to 36 years age group ($p=0.000$).

Table 3 and Graph 2 represent the predilection in the study population wherein the prevalence of periapical pathology was high in males (62.5%) and the females had prevalence rate of 37.44%.

Table 3: sex predilection in distribution of periapical pathology

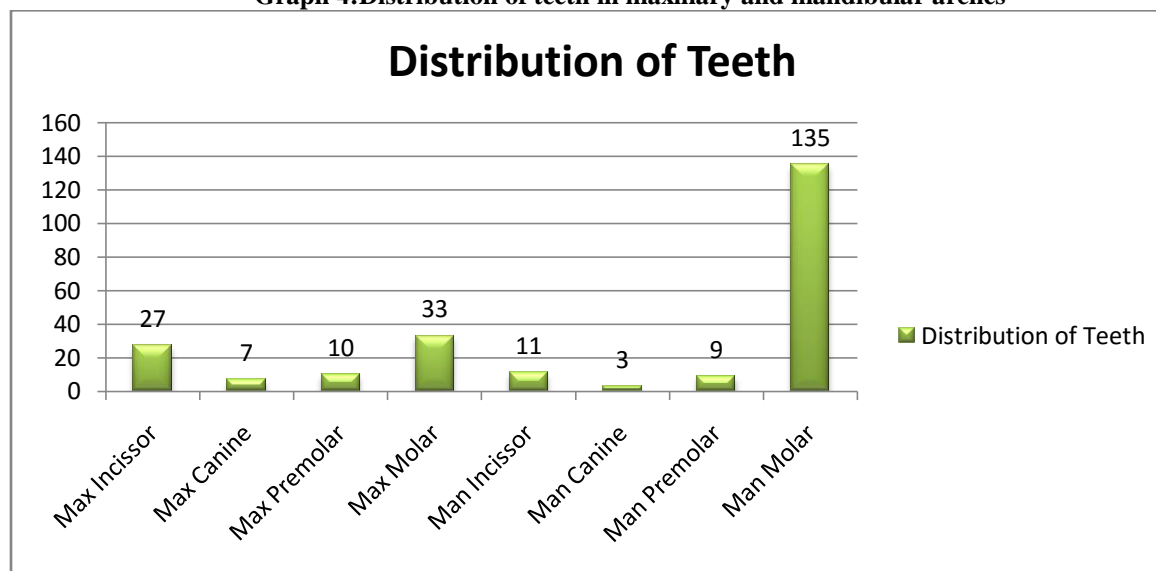
Sex	No of periapical pathologies	Chi-square test
Male	147(62.5%)	0.415
Female	88(37.44%)	

Graph 2:sex predilection in distribution of periapical pathology



No sex predilection in distribution of periapical pathology ($p=0.415$)

Graph 4:Distribution of teeth in maxillary and mandibular arches



Graph 4 The age distribution of 300 periapical pathologies were shown in, mandibular molars (135) were the most common and mandibular canines (33) were the least common sites to involve were maxillary canine(7)

Table 4: Significance of the clinical signs with each variant of periapical pathology

Radiographic diagnosis	Clinical signs						
	Extra oral swelling (%)	Intra oral swelling (%)	Sinus Tract (%)	Erythema at root apex (%)	Altered tooth color (%)	Tenderness on percussion (%)	Tenderness on palpation (%)
Widening of pdl	3.3 (p = 0.041)*	7.8 (p = 0.897)	2.2 (p = 0.015)*	34.3 (p = 0.000*)	3.3 (p = 0.033)*	93.7 (p = 0.005)*	61.4 (P = 0.000)*
Rarefying osetitis	10 (p= 0.000)*	26.7 (p=0.032)*	21.6 (P = 0.045)*	56 (p = 0.000)*	30 (p= 0.000)*	89.5 (p= 0.675)	41.5 (p= 0.000)*
Periapical cyst	2.7 (p=0.821)	5.4 (p=0.003)*	2.7 (p=0.821)	5.5 (p=0.000)*	64.9 (p = 0.000)*	5.1 (p = 0.000)*	35.1 (p = 0.000)*
Infected periapical cyst	24.3 (p = 0.000)*	86.5 (p = 0.000)*	38.5 (p = 0.023)*	89.6 (p = 0.003)*	53.0 (p = 0.000)*	94.6 (p = 0.000)*	78.4 (p = 0.033)*
Condensing osetitis	1.2 (p = 0.013)*	3.2 (p = 0.031)*	2.1 (p = 0.005)*	14.1 (p = 0.007)*	24.7 (p = 0.000)*	55.3 (p = 0.000)*	22.4 (p = 0.000)*
Both rarefying and condensing osetitis	12.8 (p = 0.000)*	20.5 (p = 0.000)*	2.6 (p = 0.650)	38.5 (p = 0.000)*	41.0 (p = 0.003)*	76.9 (p = 0.003)*	53.8 (p = 0.000)*

*p < 0.05: Statistically significant

Table 4 represents the significance of clinical signs in diagnosing each variant of periapical pathology. Extra-oral swelling was significant with radiographic diagnosis of widening of periodontal ligament space, rarefying osteitis, infected periapical cyst, condensing osteitis and both rarefying and condensing osteitis. (p=0.041, p=0.000, p=0.000, p=0.013, p=0.000)

Erythema of root apex was significant with all the variants of periapical pathology except periapical cyst and condensing osteitis. (p=0.000 with all the variants). Tenderness on palpation was seen due to pulpal necrosis and significant with all the periapical lesions. (p=0.000, p=0.000, p=0.000, p=0.033, p=0.033, p=0.000, p=0.000). Pain on palpation and percussion was also significant in all the variants of periapical pathology. (p=0.005, p=0.675, p=0.000, p=0.000, p=0.003) Erythema at root apex was also significant in all the variants of periapical pathology. P=0.000, p=0.000, p=0.000, p=0.003, p=0.007, p=0.000.

Discussion:-

The present study showed prevalence of periapical pathology as 73.8%. Other authors have reported low prevalence of periapical pathology ranging from 5 to 51%.² Similarly a study conducted by (Marmary Y, Kutiner G et al) concluded that Bone-destructive inflammatory processes (rarefying osteitis) were the most frequently encountered lesions, occurring in both the maxilla and the mandible.³ which can be correlated in our study where in rarefying osteitis had high prevalence (41.27%). Lack of dental awareness by patients visiting the dental hospitals only in an emergency could be the possible reason for high prevalence of rarefying osteitis. The other results of the present study for widening of periodontal ligament space (15.58%), condensing osteitis (14.55%), periapical granuloma (9.2%) and periapical cyst (6.3%) were similar to other studies conducted by (Rakesh Kumar Manne et al and Raphael Carlos et al^{2,5}) Widening of periodontal ligament space was about 15.58% in our present study this can be due the inflammation produce by periapical lesion the widening is greatest at the source of inflammation.¹ Condensing osteitis was about (14.55%) this can due to the gradual blending of the normal trabecular pattern into sclerotic bone¹ other variants like periapical granulomas and radicular cysts are occasionally found during routine radiograph examination. This can rarely be observed it is due chronic nature of the lesion which cannot be identified radiographically at an early stage.¹ It can be noticed only with loss of lamina dura and also with ill and well defined radiolucency or with or without bone condensation. Periapical granuloma and periapical cyst was of

less percentage this can be explained by the transitional nature of lesions which cannot be predictable. Our study shows the significance clinical signs with each variant of periapical lesions. Extra oral swelling was significant with radiographic diagnosis of widening of periodontal ligament space, rarefying osteitis, infected periapical cyst, condensing osteitis and both rarefying osteitis and condensing osteitis could be due to the pressure from the periapical abscess encroaching the surrounding tissues.² Which is similar to study conducted by Rakesh kumar et al but condensing osteitis was not significant by Rakesh et al study which contradicting to our study. Erythema of root apex was significant with all the variants of periapical pathology except periapical cyst and condensing osteitis this could be due to the inflammatory exudates raising the soft tissue overlying the periapical region and is seen with all inflammatory lesions.^{6,11} Erythema at root apex was not significant in periapical cyst and condensing osteitis this could be due to mild nature of the inflammatory lesion. Tender on palpation was significant with all the periapical lesions this can be due to necrosis of the pulp. This can be correlated by the study conducted by Ramachandran Nair P N where it suggests that even at the early stages of periapical inflammation, a firm pressure against the mucosa over the root end may incite a positive painful response.⁷ Therefore this study helps us to know that clinical signs can be correlated with radiographic features where in all the variants showed statistical significance.

Summary:-

The study helped to define the clinical signs and correlation of the radiographic features in a large population which was randomly selected. It helped to elaborate clinical signs which are transitional in periapical pathologies.⁴ The study shows statistical significance of clinical signs with each variant of periapical pathology.

Conclusion:-

This study suggested high prevalence of periapical pathology in which clinical signs and radiographic features were statistically significant. It correlated the clinical signs of periapical pathology with radiographic features. This study helps the professionals to establish diagnosis of peri-apical pathology which are transitional in nature and varied clinical signs.

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