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Research Article

Prevalence of Apical Periodontitis in Root Canal Treated Teeth from an Urban Saudi Female Population: Influence of Root Canal Fillings and Coronal Restorations

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Abstract

Aim: To determine the prevalence of apical periodontitis (AP) in root canal–treated teeth in females in Qassim region, Saudi Arabia and to evaluate the correlation of quality of the root canal fillings, coronal restorations (CR) and cast restorations with the AP.

Study Design: Cross sectional retrospective study.

Place and Duration: Female Dental clinics at College of Dentistry at Qassim University, Saudi Arabia from January 2014 to February 2017.

Materials and Methods: A total of 400 OPGs were evaluated out of which root canal treatment (RCT) had been performed in 1108 teeth. Frequencies and percentages of quality of RCT, CR and periapical status were recorded. Their association was recorded by Chi-square test and Pearson correlation was computed at significance level of 5%.

Results: Total 813 (73.4%) endodontically treated teeth presented with AP radiographically. The percentages of teeth which fulfilled the criteria of an acceptable RCT, CR and cast restoration radiographically were 8.8%, 64% and 93.6% respectively. Incidence of AP among teeth with acceptable RCT (35.1%) was significantly lower than those with unacceptable RCT (77.1%) ($P < 0.001$). Pearson correlation coefficient was computed. Length of obturation, density of root filling, quality of coronal restoration and quality of cast restoration were found to have highly significant positive correlation with AP ($r = -.375$, $r = -.162$, $r = -.118$, $r = -.079$ respectively).

Conclusion: Prevalence of AP has been found 73.4% in root treated teeth. Quality of RCT, CR and of cast restoration are significantly associated with periapical status in root filled teeth.

Keywords: *Apical Periodontitis (AP); Length of Root Fillings; Density of Root Fillings; Coronal Restoration (CR); Cast Restoration*

Introduction

Despite high success rate of root canal treatment up to 95%, high prevalence of apical periodontitis (AP) has been reported in many studies [1,2]. Apical periodontitis (AP) is a result of microbial contamination of periapical tissues that originates from a necrotic dental pulp or inadequately treated root canals [2].

High prevalence of AP indicates a health problem associated with medical, economical and ethical repercussion [3,4].

So far no study has been conducted in Qassim region of Saudi Arabia on prevalence of AP in endodontically treated teeth and its correlation with root canal treatment and final coronal restoration. This information will help to assess overall need of dental care in females in Qassim region of Saudi Arabia.

Materials and Methods

The study was started after approval from Ethical Review Committee of Qassim University (EA/73/2014). Total of 1068 digital Orthopantomogram (OPG) radiographs of female patients attended Dental Clinics of Qassim University seeking routine dental care aged from 18 - 70 years were evaluated. Total 400 OPG met the inclusion criteria and 668 OPG were excluded. Root canal treatment was done by general practitioners. OPG radiographs with 10 or more remaining natural teeth were included. Third molars teeth were excluded. Radiographs were evaluated by two calibrated, independent and expert examiners. Inter-examiner agreement was determined by computing Cohen's kappa ($\kappa = 0.82$). Disagreement between the examiners was resolved by third examiner (Supervisor).

Root treated teeth were evaluated for the presence of periapical radiolucency, quality of root canal therapy and the quality of coronal restorations.

SPSS software (version 20) was used for statistical analysis. Chi-square test was used to see the association of AP with quality of endodontic treatment, coronal and cast restoration. Pearson correlation coefficient was computed to assess the correlation of quality of root canal treatment and final restoration with AP. A 95% confidence interval was established. Significance level was established at 5%.

Results

The average patient age was 30 ± 2 years. Total 1108 root treated teeth have apical periodontitis in 73.3% (n = 813). Maxillary molars and mandibular molars presented with high prevalence of AP (79.78%, 78.85%) (Table 1).

			Periapical Radiolucency		
	Tooth Type		Present	Absent	Total (Endodontically treated teeth)
Maxilla	Incisors	Number	119	48	167
		Percent	71.26%	28.74%	15.07%
	Canines	Number	46	23	69
		Percent	66.67%	33.33%	6.23%
	Premolars	Number	170	77	247
		Percent	68.83%	31.17%	22.30%
	Molars	Number	146	37	183
		Percent	79.78%	20.22%	16.51%
Mandible	Incisors	Number	11	4	15
		Percent	73.33%	26.67%	1.35%
	Canines	Number	17	7	24
		Percent	70.83%	29.17%	2.17%
	Premolars	Number	84	40	124
		Percent	67.74%	32.26%	11.19%
	Molars	Number	220	59	279
		Percent	78.85%	21.15%	25.18%
Total Number			813	295	1108
Percent			100%	100%	100%

Table 1: *The prevalence of endodontically treated teeth and those with AP based on tooth type.*

Quality of root canal treatment has been found to affect the periapical status of teeth. Teeth with unacceptable RCT were 91.2% (1011) out of which 77.1% (n = 779) presented with apical periodontitis.

Teeth with inadequate coronal restoration have apical periodontitis in 95% (n = 379) teeth as compared to teeth with adequate coronal restorations 64% (n = 709) presented with apical periodontitis in 60.2% (n = 427) (Table 2).

Parameters	Total		Apical Periodontitis		P - Value
	Number	Percent	Number	Percent	
Endodontically treated teeth	1108	100%	813	73.3%	-
Adequate length/Adequate density of root filling (Acceptable RCT)	97	8.8%	34	35.1%	.000
Adequate length/Inadequate density of root filling (Unacceptable RCT)	350	31.6%	204	58.3%	
Inadequate length/Adequate density of root filling (Unacceptable RCT)	104	9.4%	83	79.8%	
Inadequate length/Inadequate density of root filling (Unacceptable RCT)	557	50.3%	492	88.3%	
Unacceptable RCT	1011	91.2%	779	77.1%%	-
Adequate CR	709	64%	427	60.2%%	.000
Inadequate CR	399	36%	379	95.0%%	
Acceptable RCT/Adequate CR	83	7.5%	20	24.1%	.000
Acceptable RCT/Inadequate CR	14	1.3%	7	50%	
Unacceptable RCT/Adequate CR	630	56.9%	411	65.2%	
Unacceptable RCT/Inadequate CR	381	34.3%	368	96.6%	
Adequate Cast Restoration	467	93.6%	355	76%	0.097
Inadequate Cast Restoration	32	6.4%	28	87.5%	
Acceptable RCT\Adequate cast restoration	32	6.4%	5	15.6%	.000
Acceptable RCT\Inadequate cast restoration	2	0.4%	1	50%	
Unacceptable RCT\Adequate cast restoration	435	87.2%	346	79.5%	
Unacceptable RCT\Inadequate cast restoration	30	6.0%	26	86.7%	

Table 2: *Distribution of apical periodontitis of endodontically treated teeth in relation to the quality of root canal therapy (RCT), coronal restoration (CR), cast restoration and their combination.*

Pearson correlation coefficient was computed. Length of obturation (r = -.375), density of root filling(r = -.162), quality of coronal restoration(r = -.118) and quality of cast restoration (r = -.079) were found to have highly significant correlation with AP (Table 3).

Correlations						
		Periapical Radiolucency	Length of obturation (root filling)	Density of root filling material	Quality of coronal restoration	Quality of cast restoration
Periapical Radiolucency	Pearson Correlation	1	-.375**	-.162**	-.118**	-.079**
	Sig. (2-tailed)		.000	.000	.000	.008
	N	1108	1108	1108	1108	1107
Length of obturation (root filling)	Pearson Correlation	-.375**	1	.167**	.116**	-.008
	Sig. (2-tailed)	.000		.000	.000	.790
	N	1108	1116	1116	1116	1115
Density of root filling material	Pearson Correlation	-.162**	.167**	1	.087**	.119**
	Sig. (2-tailed)	.000	.000		.004	.000
	N	1108	1116	1116	1116	1115
Quality of coronal restoration	Pearson Correlation	-.118**	.116**	.087**	1	-.125**
	Sig. (2-tailed)	.000	.000	.004		.000
	N	1108	1116	1116	1116	1115
Quality of cast restoration	Pearson Correlation	-.079**	-.008	.119**	-.125**	1
	Sig. (2-tailed)	.008	.790	.000	.000	
	N	1107	1115	1115	1115	1115

Table 3: *Correlation between periapical radiolucency and length of obturation, density of root filling material, quality of coronal restoration and quality of cast restoration.*

***. Correlation is significant at the 0.01 level (2-tailed).*

Discussion

Primary objective of this study was to assess the prevalence of apical periodontitis in root treated teeth and to determine the affect of quality of treatment on the periapical status.

In this study OPG radiographs were used for evaluating the quality of endodontically treated teeth. Two dimensional radiographs has many limitation regarding size of the lesion and actual nature of the lesion whether it is increasing in size or healing. Other drawback of this radiographic assessment is inability to examine voids due to superimposition of filling material.

Unfortunately, the criteria for judging the quality of RCT have not been well defined. Acceptable RCT was defined as having 'adequate length and density of root filling'. These subjective assessments have not been standardized or calibrated; however, the results of these subjective assessments showed that 'acceptable RCT' had significantly lower AP than those judged 'unacceptable' [8,9]. Furthermore, it has been contended that periapical diagnosis from OPGs may result in underestimation of the real prevalence of AP. However, the validity of recording AP based on OPGs is satisfactory [10].

In 279 cases of endodontically treated mandibular molars, 78.85% presented with AP. The highest number of cases with AP was seen in mandibular first molars. This tooth is the first to erupt in permanent dentition and therefore more prone to caries, trauma, operative intervention and pulp/periapical diseases.

High prevalence of apical periodontitis (73%) associated with root treated teeth as compared to other populations is an indication of overall treatment needs of patients in this region. One of the reasons could be due to inadequate and inaccessibility to dental care to the

females in this region due to cultural reasons. Absence of programs such as caries prevention and caries control at school level can also be responsible for such advances dental problems.

This figure is higher than the previous findings of several epidemiologic studies from different countries: Denmark (52%) [11], Germany (61%) [12], Japan (40%) [13], Lithuania (39%) [14], Scotland (51%) [15], Spain (64.5%) [9], Turkey (40.5%) [16] and USA (39%) [17].

Two dimensional radiographs has many limitation regarding size of the lesion and actual nature of the lesion whether it is increasing in size or healing. Other drawback of this radiographic assessment is inability to examine voids due to superimposition of filling material.

Conclusion

The study provides a baseline data for overall dental needs of patients in this region. High prevalence of apical periodontitis associated with poor quality of root canal treatment and coronal restorations necessitates better education and training of health care providers in this field.

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Conflict of Interest

There is no conflict of interest of any of author with any material, product and methods used in this study.

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