

## انتشار الآفات حول الذروية في الأسنان المعالجة لبياً عند السكان السوريين البالغين وعلاقته بنوعية حشوة القناة الجذرية

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### الملخص

خلفية البحث وهدفه: تحديد انتشار الآفات حول الذروية في الأسنان المعالجة لبياً عند المرضى السوريين البالغين، وتقييم أثر جودة الحشو القنوي في حالة الأنسجة حول الذروية. مواد البحث وطرقه: قُيِّمَتْ حالة الأنسجة حول الذروية وجودة الحشو القنوي ل 784 سناً معالجة لبياً لمرضى سوريين بالغين قصدوا كلية طب الأسنان بجامعة دمشق بهدف المعالجة باستخدام الأشعة البانورامية. أُجْرِيَ التحليل الإحصائي بواسطة square - chi . النتائج: كان انتشار الآفات حول الذروية في الأسنان المعالجة لبياً 33.4%. قيمت 18.5% من المعالجات المقدمة كمعالجات جيدة. كانت نسبة الأسنان مع أنسجة حول ذروية طبيعية للحالات ذات المعالجة القنوية الجيدة 95.2%، الذي كان بفارق دال إحصائياً عند مقارنته بالأسنان ذات المعالجة القنوية غير الكافية (66.6%). كانت النسبة العليا لنوعية المعالجة القنوية غير الكافية في الأرحاء والثنايا السفلية. الاستنتاج: تشير نتائجنا إلى نسبة انتشار عالية عند السكان السوريين لالتهابات الأنسجة حول الذروية مترافقة مع المعالجة اللبية السيئة المقدمة. كلمات مفتاحية: التهابات الأنسجة حول الذروية، وبائيات، نوعية المعالجة اللبية.

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## **Prevalence of Periapical Lesions Associated With Endodontically Treated Teeth of an Adult Syrian Subpopulation, and its Relation to the Quality of Root Canal Fillings**

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### **Abstract**

**Background & Objective:** Purpose of this study was to determine the prevalence of apical periodontitis in endodontically-- treated teeth in adult Syrian patients and to evaluate the influence of root canal fillings quality on the periapical status of these teeth.

**Methods & Materials:** Periapical status and root canal fillings quality of 784 endodontically –treated teeth of Syrian adult patients who attended Damascus dental school were evaluated using panoramic radiographs. Chi-square test was used for statistical analysis.

**Results:** Overall, the prevalence of apical periodontitis (AP) in endodontically treated teeth was 33.4%. Only 18.5 % of teeth had endodontic treatments rated as adequate. Number of teeth with healthy periapex for cases with adequate endodontic treatment was 95.2%, which was significantly high when compared to teeth with inadequate treatment (66.6%). The highest percentage of inadequate root filling was found in the molar teeth and Mandibular incisors.

**Conclusion:** Our results indicate high prevalence of AP in Syrian subpopulation associated with inadequate root canal filling.

**Keywords:** apical periodontitis, periapical status, quality of endodontic treatment, epidemiology.

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**Introduction:**

The aim of root canal treatment is to preserve or to restore the health of the periapical tissues by cleaning and shaping the root canal system and sealing it in 3 dimensions to prevent microorganism ingress to the tooth.(Ng et.al, 2008).

High success rates of more than 90% were obtained from controlled clinical studies performed by endodontic specialists under good conditions (Friedman, 1998). But these rates are substantially low in general practice (Jiménez-Pinzón, et.al, 2004, Sunayet. al, 2007). It's generally accepted that outcome of root canal treatment is positively correlated with the technical quality of root canal filling. (siögren et al 1990, Smith et.al, 1993, Sjögren et.al, 1997). According to the consensus report of the European Society of Endodontology (2006), appropriate RCT includes a radiographical control showing a radiographically dense filling with its end located between 0 and 2 mm from the apex (European Society of Endodontology, 2006).

Epidemiological studies carried out in many countries on different population groups (Table1) showed that endodontic treatments performed by dentists are not necessarily the best treatment can be afforded to these patients, and those treatments may become the cause of spreading a periradicular disease instead of maintaining healthy periapical tissues, because of a great correlation between the quality of root canal treatment and the health of periradicular tissues.

The **purpose** of this study is to assess the prevalence of apical periodontitis in root canal-treated teeth of adult Syrian subpopulation and to evaluate the influence of root canal fillings quality in the periradicular status of these teeth. This information is collected for the first time in this country, and such data is necessary to assess the effectiveness and quality of dental services introduced by Syrian dentists.

**Table 1 :Summary of some previous studies show the occurrence of root canal treatments and prevalence of apical periodontitis .**

Authors examined teeth	Country teeth with RCT (%)	Total no. Of teeth with PP	Total no. of teeth with PP	Total no. of teeth with PP
Alomari et.al, , 2011	Jordan	7390	424(5.7%)	305(71.9%)
Chen et.al, , 2007	USA	3533	169(4.8%)	60(36%)
Dugaset.al., 2003	Canada	16148	411(2.5%)	96(23%)
Frisk et.al., 2008	Sweden	12433	1056(8.5%)	260(24.6%)
Jimenez-Pinson et.al.,2004	S pain	4453	93(2%)	60(65%)
Loftus et.al.,2005	Ireland	7427	152(2%)	38(25%)
Mukhaimer R et.al., 2011	Palestine	6482	855(13.2%)	509(59.5%)
Peters et.al.,2011	Netherland	4594	224(4.9%)	54(24%)
Sunayet.al.,2007	Turkey	8731	449(5.1%)	240(53%)
Tavares et.al.,2009	France	- 1035	344(33%)	
Tsuneishiet.al.,2005	Japan	16232	3320(21%)	1329(40%)

**Materials and methods**

Panoramic x-ray were taken for randomly selected patients attended the faculty of dentistry, Damascus University for the first time (19 years old and older) who did not receive any dental treatment for more than one year. Without knowing the purpose of this study expert radiologist excluded low quality x-rays especially with distortion in anterior teeth region. The final sample consists of 200 panoramic x-rays. The total number of teeth being examined (except the third molars and extracted teeth) were 5331, 784 of them (14.7%) received endodontic treatment (tooth with a radioopaque material in the pulp chamber or root

canals). The radiographs were examined by using an x-ray viewer with double magnification and evaluated independently by two endodontist who both had more than 5 years of clinical experience. When disagreement occurred, a third observer (author) an endodontist had 25 years of clinical experience made the decision ..

The quality of root canal fillings was assessed as adequate or inadequate according to Tronstad et.al, (2000) criteria as following:

Adequate: all canals obturated with dense fillings ending about 2 mm shorter than the radiographic apex.

Inadequate: Root canal fillings end more than 2 mm shorter than the radiographic apex or grossly

overfilled. Root canal fillings with voids, unfilled canals, and/or poor condensation.

Apical status was assessed by the Periapical Index (PAI) proposed by Ørstavik et al ,1986. Who scored the apical area of the radiographic images as follows:

1. Normal periapical structures
2. Small changes in bone structure
3. Changes in the bone structure with little mineral loss
4. Periodontitis with well-defined radiolucent area
5. Severe periodontitis with exacerbating features

A healthy teeth corresponded to PAI 1 or PAI 2, whereas diseased teeth were scored as PAI 3, PAI 4, and PAI 5. The worst score of all canals was taken to represent the PAI score for multicanal teeth.

SPSS software was used for statistical analysis (SPSSInc., Chicago, IL). Differences between the groups were examined using the chi-square test.

#### Results:

Out of the 784 root canal–treated teeth examined in this study, 361 (46 %) were men and 423 (54%) women. Mandibular molars were the most frequently treated teeth (27.4%) followed by maxillary molars (20. %) and maxillary premolars (19.5%). Mandibular anterior teeth had the least frequency (3.3%). The endodontic treatment was rated as adequate in 145 (18.5%) cases, and as inadequate in 639 (81.5%) cases.

Although molars were considered the most susceptible teeth for root canal treatment, the endodontic treatment quality was inadequate in 92.6% of lower molars, 86.6% of upper molars (table 2). The quality of molar endodontic treatment in general practice in Syria is poor ( $P < .001$ ).

The most common errors seen in root-filled canals were the presence of completely empty canals (34.1%), under-fillings (32.7%), presence of voids and poor condensation of root canal filling material (28.2%), and overfillings in about 5%.

The periapical status of all endodontically treated teeth was assessed on the basis of the PAI scoring system. 95.2% of adequately treated Teeth , and 60.1% of inadequately treated teeth had normal periapex ( PAI 1, PAI 2). Apical periodontitis (PAI 2 ) was diagnosed in 262 (33.4%)endodontically treated teeth, 7 cases had adequate root canal fillings, and 255 teeth had inadequate root canal fillings . Severe Periodontitis with Exacerbating Features (PAI 5) were scored in 120 cases all with inadequate root canal treatment (table 3). Statistically, number of teeth with healthy periapex for cases with adequate endodontic treatment was highly significant when compared to teeth with inadequate treatment ( $P < .001$ ).

**TABLE 2. Distribution of root canal–treated teeth according to the tooth group and quality of root canal filling.**

(n = 784)	inadequate		Total
	adequate endodontic treatment	inadequate endodontic treatment	
	n=145(18,5%)	n= 639(81,5%)	n= 784
Maxillary anterior teeth	38(30.2%)	88 (69.8%)	126
Mandibular anterior teeth	2(7.7%)	24(92.3%)	26
Maxillary premolars	39(25.5%)	114(74,5%)	153
Mandibular premolar	29(27.1%)	78(72.9%)	107
Maxillary molars	21(13.4%)	136(86.6%)	157
Mandibular molars	16(7.4%)	199(92.6%)	215
Total	145(100%)	639(100%)	784

**TABLE 3. Periradicular status of root canal–treated teeth as related to the quality of the endodontic treatment.**

Periapical Status	inadequate		Total (n=784)
	adequate treatment	inadequate treatment	
PAI 1	127(87.6%)	274(42.9%)	401(51.1%)
PAI 2	11(7.6%)	110(17.2%)	121(15.4%)
PAI 3	7(4.8%)	96(15%)	103(13.1%)
PAI 4	0(0%)	39(6.1%)	39(5%)
PAI 5	0(0%)	120(18.8%)	120(15.3%)

## Discussion

One of the most important disadvantages of epidemiological study is their inability to explain the static nature of periapical lesion associated with endodontically treated teeth. Lesions x- ray snap shot can't determine whether the lesion in a chronic or healing process, or the time passed is not enough to let the periapical disease develops. Good reliability of epidemiological research was shown by Petersson et al, 1991, who found that the number of healed lesions equals the number of developed lesions after 10 years of follow up. According to that so many epidemiological studies started. However, Kirkevang et al. (2006) do not support this conclusion as they found that the number of healed teeth is higher than that of developed lesions after 6 years follow up.

Approximately all epidemiological studies totally depends on radiographic evaluation of the periradicular tissue healthiness, quality of root canal filling and even coronal restoration. Some studies used panoramic x-rays; others used periapical x-rays, statistically, there were no significant differences in detecting the periapical lesions however the approach was (Muhammed & Manson-Ring 1982, Boucher et al., 2002).

epidemiological studies are still valuable and give us good information about realistic endodontics in general practice with all limitations mentioned and revised by Wuet al, 2009.

this study is an epidemiological study of Syrian subpopulation attended dental clinics of Damascus university for the first time. patients came from different regions of Damascus city and its province. Those patients previously received their treatment in private dental clinics. Besides patients last treatment should be received before at least one year, so that if they had received endodontic treatment any periapical lesions probably will be healed, According to (Orstavik D., 1996) 89% of periapical lesions heal in the first year of the treatment. Another condition was availability of good panoramic radiographs without distortion. Sample of this study consisted of 54% females and 46% males. Similar epidemiological studies reported that gender had no effect on the presence of apical periodontitis (Kirkevang et al. 2001, Jimenez-Pinzon et al. 2004).

About 15% of examined teeth received endodontic treatment. That indicates the importance of endodontic therapy in daily general dental practice (about 4 teeth per patient) especially if we take in a consideration that so many extracted teeth may be extracted due to pulp or periapical disease. Our results indicate that the quality of endodontic treatment in Syria was inadequate in 18.5% of cases. Only in one study in Senegal the level of the endodontic treatment was

worse (Toureet al, 2008). As in other studies, the molar teeth were rated as the most teeth being treated and lower anterior teeth were the least. But the interesting finding here is that both treatment qualities were bad. In general, whatever the treated tooth was, the practitioner did not show any desire in offering a good treatment. That was obvious because in 34.1% of inadequately treated teeth the errors were untreated canal (the presence of only radioopaque material in the pulp chamber, or treating the wide canals and leaving the narrow ones). We can't consider this treatment as pulpotomy because it's not included in any clinical program in dental schools in Syria and not recommended at all in dental general practice. Those cases might be treated by pulp mummification using arsenic or non arsenic devitalisation materials that is commonly known and still in use.

The prevalence rate of periapical pathosis (PAI 2) in endodontically treated teeth for Syrian patients involved in this study was 33.4%. It's close to other studies and sometimes lower (Segura-Egea et al, 2004). In this study we used the scale described by Ørstavik et al, 1986, who classified the status of periapical tissue in 5 scores. But there is a disagreement about second score (which is small changes in bone structure). Some researchers consider it pathological (Kayahan et al, 2008), others as a healthy status (Toureet al, 2008, Tavares et al, 2009), that's why there might be an elevation or depression in prevalence rate in different studies. In this study we considered the second score as a healthy status which makes the rate low, but if we cut-off at 1 for evaluating periapical health the rate will be 48.8%. High prevalence of apical periodontitis is mostly related to the high prevalence of teeth with inadequate endodontic treatment. Our results confirm those of other studies which indicate a strong correlation between technical quality and periapical health whatever the geographic locations were, table 1.

In Syria, there is an economical point of view should be put in mind because most of afforded root canal treatments (81.5%) need retreatment in some way before placement of new restorations or symptoms of potential disease appear.

**In Conclusion:** This study has indicated a high prevalence of AP within a population in Syria associated with endodontically treated teeth. There was a close correlation between the quality of root filling and the prevalence of AP. The findings of the present study indicate that considerable effort should be spent by dental schools (dental curriculum) and dental societies to improve the level of endodontic treatment, such improvement in root canal treatment quality is required in general dental practice to promote periradicular health.

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