

# Frequency and Distribution of Endodontically Treated Teeth

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## ABSTRACT

**Objective:** To determine the distribution and pattern of carious teeth involvement in permanent teeth requiring endodontic treatment.

**Study Design:** Cross-sectional study.

**Place and Duration of Study:** Dental Section of The Aga Khan University Hospital, Karachi, from September 2004 to March 2005.

**Methodology:** Data was collected from the dental records of patients. Tooth was the unit of evaluation. Variables studied were demographics, tooth type, etiology of endodontic treatment and pattern of caries involvement. Data was analyzed using chi-square test and Fischer's exact test.

**Results:** The total number of patients was 190; total number of teeth involved were 235. Females had more endodontically treated teeth than males. There was no significant difference in the distribution of etiology of endodontic treatment in both genders ( $p=0.564$ ). An increasing trend of endodontic procedure was observed with the increasing age of patients. Caries was the most common etiological factor leading to endodontic treatment ( $p = 0.011$ ). Class-II cavity i.e. proximal surface of teeth was the most commonly involved surface in endodontically involved teeth ( $p < 0.001$ ). More molars had been endodontically treated followed by premolars and anterior teeth.

**Conclusion:** Caries was the most common etiologic factor; lower molars were the most commonly involved and lower anteriors the least commonly involved teeth in endodontic procedure. Significant association was observed between etiology and tooth type. Significant association was found between cavity classification and etiology of endodontic treatment with class-II caries being most common.

**Key words:** Endodontics. Endodontically treated teeth. Epidemiology. Cariology.

## INTRODUCTION

Endodontic therapy defined by the European Society of Endodontology is a procedure that is designed to maintain the health of all or part of the pulp.<sup>1</sup> When the pulp is diseased or injured, treatment is aimed at preserving normal periradicular tissues, to cure or prevent periradicular periodontitis.<sup>2</sup> The objective of endodontic therapy is the restoration of the treated tooth to its proper form and function in the masticatory apparatus, in a healthy state. Recent records of patients treated in dental schools and by general practitioners, indicate that 95% success is obtainable in endodontics.<sup>3</sup>

The rate of dentate individuals has increased over the last decades.<sup>4</sup> The prevalence of root-filled teeth has also increased with age. This change in frequency of dentate individuals in the population may be due to the wide spread use of oral hygiene measures, new and better restorative materials and methods, regular dental checkups and a declining tendency amongst dentists to extract teeth.<sup>5</sup>

Caries is the most common cause of tooth loss leading to endodontic treatment.<sup>6,7</sup> Carious surfaces involved must also be assessed, to identify the susceptible surfaces. Studies have been conducted on the prevalence of root-filled teeth in many different countries, but not in Pakistan.<sup>8-16</sup> In Pakistan, the most common etiological factor leading to endodontic treatment was found to be irreversible pulpitis.<sup>17,18</sup>

It is important to identify the most frequently involved tooth and pattern of tooth surface involvement in caries, to identify the location of the tooth and to reinforce oral hygiene measures from the time of eruption of the tooth. These measures might prevent pulpal exposure and the need for endodontic therapy in the future. The objective of this study was to determine the distribution and pattern of carious teeth involvement in permanent teeth requiring endodontic treatment.

## METHODOLOGY

This descriptive study was carried out from September 2004 to March 2005 at the Aga Khan University Hospital, Karachi. Data collection was done using purposive sampling technique from patient's dental record files on a structured proforma.

The inclusion criteria for the study were patients of either gender in the age range of 6-58 years having either received endodontic treatment or retreatment or

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diagnosed with the need for endodontic treatment on their assessment. Patients with endodontically involved deciduous teeth, wisdom teeth and patients with incomplete records were excluded.

Tooth was the unit of evaluation. The variables studied were demographics, tooth type, etiology of endodontic treatment and pattern of caries involvement. The teeth were divided into upper molars, lower molars, upper pre-molar, lower pre-molars, upper anteriors and lower anteriors.

Data was collected on structured proformas. Data analysis was done using SPSS version 16.0. Chi-square test and Fischer’s exact test were applied to determine the association between various patient-related variables. P-value ≤ 0.05 was taken as statistically significant.

### RESULTS

The study sample consisted of 190 patients and the total number of teeth involved were 235. Females (n=127, 54%) had more endodontically treated teeth as compared to males (n=108, 46%). There was no significant gender difference in the distribution of etiology (p=0.564). Patients had been divided into four age groups, 6-20 years, 21-30 years, 31-40 years, and the last 41-58 years age groups. Most of the patients (n=84, 35.7%) belonged to the 41-58 year age group with a mean age of 35.8±13 years. Thus an increased trend of endodontic procedure was observed with the increasing age of patients.

Caries (n=204, 86.8%) was the most common etiological factor leading to endodontics therapy followed by trauma (n=13, 3.5%), root canal failure (n=8, 3.4%), tooth wear (n=6, 2.6%) and elective endodontic procedure (n=4, 1.7%). Significant association (p=0.011) was observed between etiology and tooth type. Lower molars were the most commonly involved teeth and lower anteriors were the least involved teeth in endodontic procedure. Reasons other than caries like trauma, root canal failure, tooth wear and elective endodontic procedure were redundant and hence were grouped together for analysis (Table I).

**Table I:** Tooth involved and etiology.

Tooth involved [n (%)]	Etiology		p-value
	Caries	Others	
Upper molar [56 (23.8)]	54 (96.4)	2 (3.6)	0.011
Lower molar [71 (30.2)]	63 (88.7)	8 (11.3)	
Upper premolar [47 (20)]	42 (89.4)	5 (10.6)	
Lower premolar [25 (10.6)]	19 (76)	6 (24)	
Upper anterior [28 (11.9)]	21 (75)	7 (25)	
Lower anterior [8 (3.4)]	5 (62.5)	3 (37.5)	
Total [235 (100)]	204 (81.8)	31 (13.2)	

Significant association was observed (p < 0.001) between cavity classification and etiology of endodontic treatment, where class-II cavity that is proximal surface,

was the most commonly involved followed by class-I cavity that is occlusal surface (Table II).

Mostly molars (n=127 54%) had been root treated compared to pre-molars (n=72, 30.6%) and anterior (n=36, 15.3%) teeth.

Mandibular first molar (n=50, 21.2%) was the most commonly involved tooth in endodontics and mandibular anteriors (n=8, 3.4%) were the least involved.

**Table II:** Cavity classification and etiology.

Cavity classification [n (%)]	Etiology		p-value
	Caries n (%)	Others (%)	
Class-I [60 (25.5%)]	46 (76.7)	14 (23.3)	0.011
Class-II [146 (62.1)]	140 (95.9)	6 (4)	
Others [29 (12.3)]	18 (62.1)	11 (37.9)	
Total [235 (100)]	204 (86.8)	31 (13.2)	

### DISCUSSION

With the awareness that natural teeth function is more efficient than any replacement, additional effort has been considered worth while to retain pulpally involved teeth. By the late 1930s, the treatment of pulpless teeth became an integral part of dentistry. The role of endodontics has greatly broadened in scope in the past 40 years. Although many factors are responsible, the most important reason behind this growth is the extremely high predictability of endodontic success. According to Carrotte, prognosis of root treated teeth is 90-95% for initial root canal treatment, without radiographic evidence of a periradicular lesion; 80-85% when a periradicular lesion is present and 65% for retreatment cases with a periradicular lesion.<sup>4</sup>

It has been found in this study as well as others that endodontically treated teeth are more prevalent with advancing age.<sup>5,9,10,16</sup> This is not surprising because older patients and their teeth have been exposed to the pertinent etiologic factors for a much longer period than the young and thus tend to have more endodontically treated teeth.

In this study, more posterior teeth molars had been root treated compared to pre-molars and anterior teeth coinciding with other studies.<sup>5,8</sup> Caries was the most common etiological factor leading to endodontic therapy, followed by trauma, which also coincides with other studies as well.<sup>6,7,19</sup>

In this study like another study<sup>18</sup>, mandibular first molar was the most frequently involved tooth in endodontic therapy and significant association was observed between etiology and tooth type, where caries was the most common etiologic factor leading to endodontic procedure.<sup>6,7</sup> Mandibular first molar is the first tooth to erupt in the oral cavity at 6 years of age and also remains in the oral cavity for the longest duration, indicating the increased susceptibility to caries and endodontic therapy.<sup>8</sup> Normally the most frequently

affected sites are the pits and fissures of posterior teeth (pre-molars and molars),<sup>20</sup> but the increased susceptibility of interproximal surfaces to caries like in this study, emphasizes the importance of reinforcing oral hygiene measures like brushing and flossing, as soon as the first tooth erupts in the oral cavity.

There is a general trend in treatment strategy amongst dentists towards more preventive and conservative treatment and extraction of teeth is the last choice.<sup>5</sup> Thus in the field of endodontics, there have been advances in manual and rotary instrumentation techniques. Several new nickel–titanium (Ni–Ti) instruments for rotary endodontic treatment have extended the endodontic armamentarium that maintains the original root canal curvature well.<sup>21-23</sup> Endodontic success rate has increased due to these advancements. Fewer extractions are performed and the frequency of denture wearers has decreased. Information about frequency and distribution of endodontically treated teeth may help predict future needs for dental treatment in the growing dental population.

The study was carried out at a tertiary care centre, so results cannot be generalized to the general population. Further studies should be carried out at a community level so that the results can be generalized to the general population.

## CONCLUSION

An increased trend of endodontic procedure was observed by the age of patients and females had more endodontically treated teeth than males. Significant association was observed between etiology and tooth type where caries was the most common etiologic factor. Lower molars were the most commonly involved and lower anteriors the least commonly involved teeth in endodontic procedure. Significant association was also found between cavity classification and etiology of endodontic treatment, with class-II caries being the most common.

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## REFERENCES

1. European Society of Endodontology. Quality guidelines for endodontic treatment: consensus report of the European Society of Endodontology. *Int Endod J* 2006; **39**:921-30.
2. Trope M. The vital tooth: its importance in the study and practice of endodontics. *Endodon Topics* 2003; **5**:1-1.
3. Weine. Endodontic therapy. 4th ed. St. Louis: *Mosby*; 1989.
4. Carrotte P. Endodontics: Part 2 Diagnosis and treatment planning. *Br Dent J* 2004; **197**:231-8.
5. Kirkevang LL, Horsted-Bindslev P, Ørstavik D, Wenzel A. Frequency and distribution of endodontically treated teeth and apical periodontitis in an urban Danish population. *Int Endod J* 2001; **34**:198-205.
6. Ridell K, Sundin B, Matsson L. Endodontic treatment during childhood and adolescence. A survey of 19-year-olds living in the city of Malama, Sweden. *Swed Dent J* 2003; **27**:83-9.
7. Baelum V, Fejerskov O. Tooth loss as related to dental caries and periodontal breakdown in adult Tanzanians. *Community Dent Oral Epidemiol* 1986; **14**:353-7.
8. Wayman BE, Patten JA, Dazey SE. Relative frequency of teeth needing endodontics treatment in 3350 consecutive endodontics patients. *J Endod* 1994; **20**:399-401.
9. Eckerbom M, Andersson JE, Magnusson T. A longitudinal study of changes in frequency and technical standard of endodontic treatment in a Swedish population. *Endod Dent Traumatol* 1989; **5**:27-31.
10. Georgopoulou MK, Spanaki-Voreadi AP, Pantazis N, Kontakiotis EG. Frequency and distribution of root filled teeth and apical periodontitis in a Greek population. *Int Endod J* 2005; **38**:105-11.
11. Zaatar EI, al-Kandari AM, Alhomaidah S, al-Yasin IM. Frequency of endodontic treatment in Kuwait: radiographic evaluation of 846 endodontically treated teeth. *J Endod* 1997; **23**:453-6.
12. Krmek SJ, Dadic T, Miletic I, Mehicic GP, Simeon P, Anic I. Frequency and distribution of root filled teeth and apical periodontitis in an adult urban Croatian population: R78. *Int Endod J* 2005; **38**:945.
13. Eriksen HM, Bjertness E, Ørstavik D. Prevalence and quality of endodontic treatment in an urban adult population in Norway. *Endod Dent Traumatol* 1988; **4**:122-6.
14. De Cleen MJ, Schuurs AH, Wesselink PR, Wu MK. Periapical status and prevalence of endodontic treatment in an adult Dutch population. *Int Endod J* 1993; **26**:112-9.
15. Buckley M, Spångberg LS. The prevalence and technical quality of endodontic treatment in an American subpopulation. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1995; **79**:92-100.
16. Soikkonen KT. Endodontically treated teeth and periapical findings in the elderly. *Int Endod J* 1995; **28**:200-3.
17. Lal U, Yawar AAS, Rashid S. Reasons for root canal treatment in the Department of Endodontics of Fatima Jinnah Dental College Hospital, Karachi. *Pak Oral Dental J* 2003; **23**:151-2.

18. Vohra F, Ahmed I, Zakai M, Shaikh A. An evaluation of etiologic factors for root canal therapy. *J Pak Dent Assoc* 2005; **14**:154-7.
19. Chan CP, Tseng SC, Lin CP, Huang CC, Tsai TP, Chen CC. Vertical root fracture in non-endodontically treated teeth: a clinical report of 64 cases in Chinese patients. *J Endod* 1998; **24**:678-81.
20. Kidd EAM, Smith BGN. Pickards manual of operative dentistry. 7th ed. New York: *Oxford University Press*; 1996.
21. Versümer J, Hülsmann M, Schafers F. A comparative study of root canal preparation using Profile .04 and Lightspeed rotary Ni-Ti instruments. *Int Endod J* 2002; **35**:37-46.
22. Hülsmann M, Gressmann G, Schäfers F. A comparative study of root canal preparation using FlexMaster and HERO 642 rotary Ni-Ti instruments. *Int Endod J* 2003; **36**:358-66.
23. Paqué F, Musch U, Hülsmann M. Comparison of root canal preparation using RaCe and ProTaper rotary Ni-Ti instruments. *Int Endod J* 2005; **38**:8-16.

