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ORIGINAL ARTICLE

Prevalence and Reasons for Extraction of Endodontically Treated Teeth in Adult Nigerians

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ABSTRACT

Aim: Teeth extraction is an important problem in elder patients. Although some of these teeth have been endodontically treated, many of them may be subjected to extraction. The reasons for extraction are important for prevention planning in further patients. The aim of this study was to assess the prevalence and important reasons for extraction of endodontically treated teeth in adult Nigerians.

Materials and methods: This study involved a retrospective examination of 2,000 case files in the archives of the University of Nigeria Teaching Hospital. Out of the 2,000 case files, 650 concerned endodontically treated teeth.

Results: The prevalence of extractions in the population was 21.5%. This was more often in the mandible (67.9%) than in the maxilla (32.1%). In both jaws, more molars were extracted (57.1%), followed by premolars (27.1%) and anterior teeth (15.7%). Extractions occurred 57.1% of times in females. However, the rate of extraction decreased with age but peaked in the 51-60 year age band.

Conclusion: The association between age and extraction was proven. Caries, vertical root fracture and endodontic reasons accounted for the commonest cause of extraction in the mandible; while in the maxilla, endodontic reasons and cusp fracture caused extractions most often.

Clinical significance: The reasons for extraction of endodontically treated teeth are different between maxilla and mandible.

Keywords: Endodontics, Retrospective study, Tooth extraction.

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INTRODUCTION

Oral health should include the preservation of all permanent teeth whenever it is possible; however, this is not always possible. Endodontic treatment can help to maintain a vital or non-vital tooth in function.[1,2] However, root canal therapy has some special shortcomings. Its success rate is reported to be 30 to 98%;[3] and about 94% of all teeth remain functional after 3.5 years after initial treatment.[4] Technical difficulties may be the most common factor which results in treatment failure.[5] Unfortunately, most failed cases remain unredeemable and ultimately the teeth get extracted. Zadik et al.[6] reported that after 8 years of initial treatment, 3% of the teeth were extracted. Chen et al.[7] also showed that after 5 years of initial treatment, 7.5% of the endodontically treated teeth had been extracted. In a recent study by Tzimpoulas et al.,[8] the authors examined 275 teeth prospectively and showed that 217 (79%) were finally extracted.

Possible reasons for extraction of endodontically treated teeth are different.[9-11] These may include non-restorable large decay, deep fracture, vertical root fracture, end-stage periodontal diseases, periapical lesions, incomplete root fillings, etc.[6,9,11] Unfortunately, the level of contributions of these factors is not unanimously agreed among authors. However, both Fuss et al.[9] and Tirosh et al.[12] agree that restorative reason is the commonest, while Vire[10] found prosthetic reason is the commonest. In a recent research, Dikbas et al.[11] concluded that periodontal reasons are the most encountered reasons for extraction of the crowned teeth.

One study[6] has found that mandibular first molars, followed maxillary first molars, mandibular second molars, and maxillary second premolars are the commonest extracted teeth. However, Tzimpoulas et al.[8] showed that maxillary molars are the teeth most extracted. The second rank was related to mandibular premolars. As a reason for such extractions, there is a 5 to 8 fold increase in the prevalence of periodontal disease in smokers over nonsmokers.[6] Furthermore, it has been shown that treated teeth without full coverage were lost at a rate 5 to 6 fold higher than fully covered ones.[13,14] On the other hand, some studies[6,13] reported no significant difference between extraction rate and posting of endodontically treated teeth.

The trend is now from healing to the functionality of endodontically treated teeth as a measure of treatment outcome. The purpose of this study was to investigate the prevalence of extraction of endodontically treated teeth in adult Nigerians and to highlight the reasons for such extractions. It is believed that this study will enable clinicians to exercise care in case selection and treatment planning, as well as in making predictable evidence-based decision of cases.

MATERIALS AND METHODS

This cross-sectional study involved a retrospective examination of 2,000 case files in the archives of the Medical Records Department of the University of Nigeria Teaching Hospital (UNTH), in cooperation with Mashhad University of Medical Sciences (MUMS). The Research Council of MUMS approved the protocol (Registration number: 910674).

- Inclusion criteria included case files of subjects with:
- Age 18 to 60 years
- History of nonsurgical root canal treatment (RCT) over a two year period (2008–2009)

Need extraction.

Exclusion criteria included case files of subjects with:

- No periapical radiograph or those with poor quality radiographs (Figure 1 shows some samples of radiographs)
- Extraction before RCT was completed
- Endodontically treated third molars
- Incomplete data of the records.

Out of the 2,000 case files, 650 concerned endodontically treated teeth. Out of this, 21.5% (140) suffered untoward events of extractions. Subject's socio-demographic data, tooth type, and the main reason for the extraction were recorded in the datasheet. Others were dental status (crowned or posted) and oral health habit (smoking). The data were analyzed and the results tested with Chi-square test, while the critical level of significance was set at $p \leq 0.05$.

RESULTS

A total of 140 subjects, aged 18 to 60 years with a mean age of 32.63 ± 12.25 participated in the study. The prevalence of extractions in the population was 21.5%. This was more

Fig. 1: Some samples of radiographs

often in the mandible 95 (67.9%) than in the maxilla 45 (32.1%) ($p > 0.05$). In both jaws, more molars were extracted 80 (57.1%), followed by premolars 38 (27.1%) and anterior teeth 22 (15.7%) ($p > 0.05$). Extractions occurred 57.1% of times in females than in males ($p > 0.05$). However, the rate of extraction decreased with age but peaked in the 51 to 60 year age band ($p < 0.05$) (Graph 1).

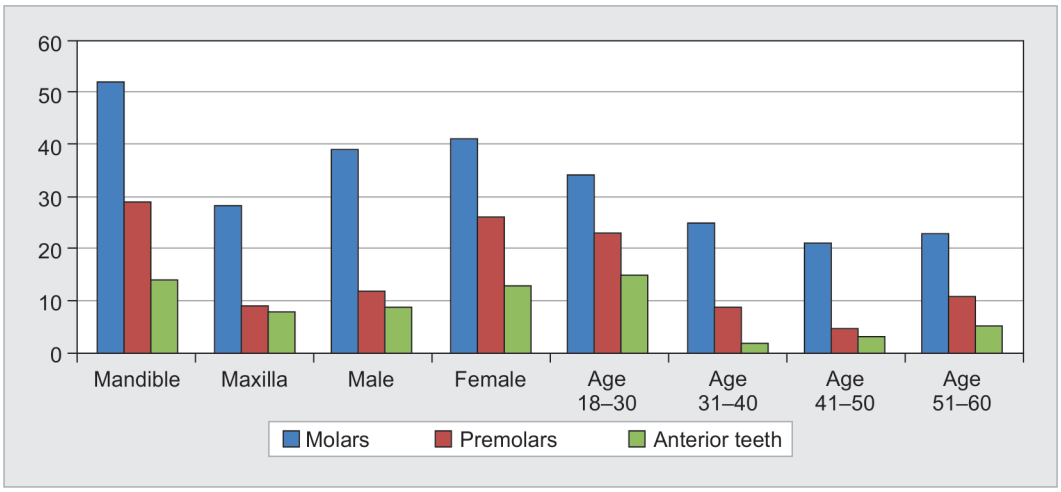
The relationship between extraction rate and being posted or veneered was highly significant ($p < 0.05$). About 89 (64%) of the extractions occurred in the first 3 years ($p > 0.05$) (Table 1).

The association between age and extraction was statistically proven ($p < 0.05$). Furthermore, caries 30 (21.4%), vertical root fracture 26 (18.6%), and endodontic reasons 23 (16.4%) accounted for the commonest cause of extraction in the mandible, while in the maxilla, endodontic reasons 11 (7.9%) and cusp fracture 10 (7.1%) caused extractions most often ($p > 0.05$). The association between smoking and extraction was statistically significant ($p = 0.05$). Out of 140 subjects, 25 smoked and had a total of 450 standing teeth (average of 18 teeth), while 115 were nonsmokers with a total of 3450 teeth (average of 30 teeth). Amongst smokers, 23 (5.1%) teeth were extracted as against 122 (3.5%) in nonsmokers. In smokers, endodontic failures accounted for the highest tooth extraction 8 (1.8%), followed by caries 5 (1.1%) and VRF 5 (1.1%). On the other hand, caries and VRF equally were the commonest cause of tooth extraction in nonsmokers. Paradoxically, in both types of subjects, periodontal disease and trauma caused tooth loss least in the study (Table 2).

DISCUSSION

This study is a retrospective report suffers from limitations common with similar studies. Unlike other types of studies, the current one is highly restrictive in age, sex, and other research variables. Also, since it is likely that endodontic outcome is dependent on the operator's skill and proficiency, it was difficult for the present study to give definition along this, because of blinding of operator's identity. It is likely that most of the 650 cases of endodontic therapy that suffered an untoward event of extraction lacked standard isolation as they might have differed in design, treatment protocols, methodology, recall rate, and observation period. Above all, some case files contained incomplete data. Nevertheless, retrospective studies are of value epidemiologically and clinically in providing both clinical and research information useful in advancing knowledge.

Compared with 3% extraction rate in Zadik et al.[6] study, 21.5% rate in the current report is in on the high side. The disparity may be due to non-standardization in design, methodology, treatment protocols, etc. Application of modern concepts, materials, and techniques as opposed to the practice in developing nations, may have accounted for the rate in Zadik et al.[6] report. Furthermore, it may also



Graph 1: Extraction by jaw, gender, and age

Table 1: Extraction by longevity and dental state of extraction

	Molars	*Premolars*	*Anteriors*	*p-value*
Dental Status				
Posted	16	9	9	p = 0.000
Veneered	–	–	12	
Longevity (Yrs)				
1–3	54	23	12	p = 0.604
4–6	25	13	9	
7–9	1	2	1	

Table 2: Extraction reason by age, jaw, and smoking habit

	Caries	*Cusp*	*PD*	*Endo*	*VRF*	*Trauma*	*p-value*
Age							
18-30	9	1	2	10	10	7	p=0.000
31-40	9	8	0	8	10	2	
41-50	8	4	2	9	8	–	
51-60+	7	9	14	6	6	–	
Jaw							p=0.077
Mandible	30	12	13	23	26	4	
Maxilla	5	10	5	11	9	5	
Smoking							
Yes	5 (1.1%)	3 (0.7%)	2 (0.4%)	8 (1.8%)	5 (1.4%)	–	P=0.05
No	30 (0.9%)	19 (0.6%)	16 (0.5%)	26 (0.8%)	30 (0.9%)	1 (0.03%)	

Key: Cusp=cusp fracture; PD=periodontal disease; Endo=endodontic reasons; VRF=vertical root fracture

be that more subjects in the current study suffered most often from procedural accidents or that they smoked more.

Though the relationship between jaw and tooth types, extraction was not statistically proven, the result is however similar to that of Zadik et al.[6] More untoward events seen in molars anticipated procedural difficulties associated with molar endodontic treatment.

Unlike the previous report,[8] the current one found that the rate of extraction decreased with age, but peaked in the 51 to 60 years age band. This may be due to physiological changes.

The higher incidence of extraction in uncovered endodontically treated teeth in the current report agrees with others.[15-17] Uncovered teeth are extracted 5 to 6 times more than covered ones.[17] Proneness to extraction may be due to a cumulative loss of tooth structure from caries, restorative/endodontic procedures, and loss of a marginal ridge.[18]

The rate of extraction of posted teeth in the current study agrees with Sorensen et al.[19] This may be due to unskillful post insertion.

The current report's finding on longevity agrees with that of Salehrabi et al.[13] They found that most untoward events occurred in the first 3 years after initial treatment. Longevity may be influenced by the amount of remaining coronal structure[20] or preoperative pulp/periapical status.[10] Also, it is likely that longevity may depend more on the adequacy of coronal reconstruction rather than on the quality the endodontic treatment.[10] Chen et al.[7] showed that 10.67% of the extracted cases were attributed to endodontically related diseases. Furthermore, loss of receptors and an elevated pain threshold in endodontically treated teeth may lead to decreased protection and therefore shortened longevity.[20] The loss of coronal seal and its effect on the failure of endodontic treatments should be considered as an important factor in the extraction of the endodontically treated teeth.[21,22]

The reason for the extraction of endodontically treated teeth is variable. The variations may be due to differences in study design and sample, methodology and treatment protocol, etc. Whereas vertical root fracture accounted for the majority of extractions in the current study, endodontic and prosthetic reasons featured prominently in the reports of Fuss et al.[9] and Vire[10] respectively. Yoshino et al.[23] in 2015 showed that 31% of teeth were extracted by VRF, and 93% of these were endodontically treated teeth. Among non-vital teeth, 82% had screw posts or cast posts. It is possible that there were more posted teeth in the current study than in the other reports[9,10] or that such post were unskillfully inserted or that excessive pressure was used during insertion. Furthermore, the volume expansion of post due to corrosion or gutta-percha placement using excessive pressure may be further reasons.

CONCLUSION

The association between age and extraction was proven. Caries, vertical root fracture and endodontic reasons accounted for the commonest cause of extraction in the mandible; while in the maxilla, endodontic reasons and cusp fracture caused extractions most often.

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REFERENCES

1. Da'ameh, D. Reasons for permanent tooth extraction in the North of Afghanistan. J Dent 2006;34:48-51.
2. Qualtrough, AJ, Mannocci F. Endodontics and the older patient. Dent Update 2011;38:559-562, 564-566.

3. Friedman S, Mor C. The success of endodontic therapy-healing and functionality. J Calif Dent Assoc 2004;32:493-503.
4. Lazarski MP, Walker WA 3rd, Flores CM, Schindler WG, Hargreaves KM. Epidemiological evaluation of the outcomes of nonsurgical root canal treatment in a large cohort of insured dental patients. J Endod 2001;27:791-796.
5. Hargreaves KM, Cohen S. Cohen's pathways of the Pulp. 10th edn. P74. St Louis, Mosby,1994.
6. Zadik Y, Sandler V, Bechor R, Salehrabi R. Analysis of factors related to extraction of endodontically treated teeth. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2008;106:e31-35.
7. Chen SC, Chueh LH, Hsiao CK, Wu HP, Chiang CP. First untoward events and reasons for tooth extraction after nonsurgical endodontic treatment in Taiwan. J Endod 2008;34:671-674.
8. Tzimpoulas NE, Alisafis MG, Tzanetakis GN, Kontakiotis EG. A prospective study of the extraction and retention incidence of endodontically treated teeth with uncertain prognosis after endodontic referral. J Endod 2012;38:1326-1329.
9. Fuss Z, Lustig J, Tamse A. Prevalence of vertical root fractures in extracted endodontically treated teeth. Int Endod J 1999;32:283-286.
10. Vire DE. Failure of endodontically treated teeth: classification and evaluation. J Endod 1991;17:338-342.
11. Dikbas I, Tanalp J, Tomruk CO, Koksal T. Evaluation of reasons for extraction of crowned teeth: a prospective study at a university clinic. Acta Odontol Scand 2013;71:848-856.
12. Tirosh A, Shai I, Tekes-Manova D, et al. Normal fasting plasma glucose levels and type 2 diabetes in young men. New England J Med 2005;353:1454-1462.
13. Salehrabi R, Rotstein I. Endodontic treatment outcomes in a large patient population in the USA: an epidemiological study. J Endod 2004;30:846-850.
14. Aquilino SA, Caplan DJ. Relationship between crown placement and the survival of endodontically treated teeth. J Prosth Dent 2002;87:256-263.
15. Kojima K, Inamoto K, Nagamatsu K, et al. Success rate of endodontic treatment of teeth with vital and nonvital pulps. A meta-analysis. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2004;97:95-99.
16. Ray HA, Trope M. Periapical status of endodontically treated teeth in relation to the technical quality of the root filling and the coronal restoration. Int Endod J 1995;28:12-18.
17. Mindiola MJ, Mickel AK, Sami C, Jones JJ, Lalumandier JA, Nelson SS. Endodontic treatment in an American Indian population: a 10-year retrospective study. J Endod 2006;32:828-832.
18. Reeh ES, Messer HH, Douglas WH. Reduction in tooth stiffness as a result of endodontic and restorative procedures. J Endod 1989;15:512-516.
19. Sorensen JA, Martinoff JT. Intracoronal reinforcement and coronal coverage: a study of endodontically treated teeth. J Prosth Dent 1984;51:780-784.
20. Randow K Glantz PO. On cantilever loading of vital and non-vital teeth. An experimental clinical study. Acta Odont Scand 1986;44:271-277.
21. Sritharan A. Discuss that the coronal seal is more important than the apical seal for endodontic success. Aust Endod J 2002;28:112-115.
22. Naseri M, Ahangari Z, Shahbazi Moghadam M, Mohammadian M. Coronal sealing ability of three temporary filling materials. Iran Endod J 2012;7:20-24.
23. Yoshino K, Ito K, Kuroda M, Sugihara N. Prevalence of vertical root fracture as the reason for tooth extraction in dental clinics. Clin Oral Investig 2015;19:1405-1409.