

Causes and Patterns of Tooth Loss Among Patients Attending Riyadh Elm University Hospital: A Cross-Sectional Study

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ABSTRACT

Objective: To investigate the major causes of tooth loss among patients attending Riyadh Elm University (REU) hospital, taking into consideration the patient's age, gender, and tooth type.

Subjects and Methods: Data were collected by undergraduate, postgraduate students, and interns through a questionnaire with specific inclusion and exclusion criteria. The specification of the patient's age, gender, tooth type, and the reason for extraction was required.

Results: A total of 895 teeth were extracted from 385 patients, of which 51% were extracted due to dental caries, whereas 21% were extracted because of periodontal disease. There is a statistically significant relationship between age and reasons for tooth extraction (P -value < 0.000). Maxillary molars were extracted mostly due to dental caries (64.8%). On the contrary, mandibular anterior teeth were extracted mainly due to periodontal disease (39.6%). No significant relationship was detected between gender and reasons for tooth extraction.

Conclusion: Dental caries and periodontal disease were the leading causes of tooth extraction.

Keywords

Tooth extraction, Caries, Periodontal disease, Saudi Arabia.

Introduction

Oral diseases are widely prevalent and costly to treat. However, they are also largely preventable [1]. Both dental caries and periodontal diseases are considered major oral diseases in the community. Dental caries prevalence ranges from 49-83% in five and six years old children, whereas 47-45% of permanent teeth were presented with dentinal caries [2]. On the other hand, periodontal disease was diagnosed in 11-43% among national studies carried out in the United States and Australia [3]. Tooth loss is the consequence of leaving these diseases untreated [4,5].

Tooth extraction results in complex consequences for both the

dentist and the patient [6]. The number of remaining teeth is one of the most accepted measurements of oral health and its relation to the quality of life [5,6]. Teeth edentulism might result in poor dietary habits, reduced quality of life, and social and psychological problems [7,8]. It had been found that at least 20 teeth are needed for adequate function and using removable dentures reduced the functional efficiency by 30-40% compared to natural dentition [9,10]. During the last decades, a reduction in tooth loss among adults had been observed, especially in industrialized countries [11,12]. It is noted that edentulism could be observed in middle-aged groups with this condition being more prevalent in the socially deprived group [11].

Tooth loss may occur due to dental caries, periodontal diseases, dental trauma, orthodontics, and prosthodontic reasons [4].

Although dental caries and periodontal diseases are considered the leading causes of tooth loss, geographical and cultural differences between different countries had been reported [13]. In Germany and Canada, it was stated that periodontal disease was the most frequent reason for tooth extraction [14,15]; however similar proportions of caries and periodontal disease were found in Italy and Singapore [16,17]. Assessment of tooth mortality data in different areas of the world is important for evaluating the available dental care and preventive oral health programs. In addition, understanding the contribution of major causes of tooth loss helps in proper allocation of dental resources in order to reduce such loss [18].

Few studies have been conducted in the Kingdom of Saudi Arabia to assess the reasons for tooth extraction [19-23]. Caries and periodontal disease have been reported as the primary reasons for tooth loss in most of these studies. However, no studies included private hospitals in the Kingdom of Saudi Arabia. Additionally, most of the studies were conducted for more than five years. Assessing the changes in reasons of tooth loss with significant alternations in educational levels and social openness is needed. Therefore, the aim of this study is to investigate the major causes of tooth loss among patients attending Riyadh Elm University (REU) hospital taking in consideration the patient's age, gender, and tooth type.

Subjects and Methods

This is a cross-sectional study conducted in REU hospital to evaluate the reasons for tooth loss in this academic institute during the period from February to November 2017. The ethical approval was granted from the ethical committee in REU research centre with registration number FPGRP/43731002/114. Consent forms were signed, and confidentiality was maintained. Both undergraduate, postgraduate students and interns in REU received an e-mail explaining the purpose of the study and encouraging them to participate in this study. Students who agreed to participate in this study received a form that needed to be filled for each tooth extraction case they encountered during one academic course. Table 1 illustrated the inclusion criteria, similar to Murray et al. [4]. The third molar, impacted teeth, and primary teeth were excluded from this study.

Extraction criteria	
Caries	Initial and recurrent caries, this category includes all sequelae of caries, including extracted roots, where the crown was lost through caries and teeth fracturing due to weakening by caries
Failed root canal treatment	Radiographic and clinical failure
Periodontal disease	Where pain, loss of function or pocketing requires that the tooth be extracted
Orthodontic	Teeth extracted to prevent or correct malocclusion, be they incompletely erupted or supernumerary
Prosthodontic	Teeth which are extracted because their removal facilitates a better prosthetic restoration
Trauma	Teeth lost only as a result of trauma, including jaw fractures (fractured restorations should be placed in the caries category)

Pericoronitis	Persistent inflammation around the tooth which necessitates the removal of it
Patient request	Teeth extracted because the patient prefers extraction to other treatments, or requests a clearance and dentures. Also in this category, extractions performed due to the patient's behaviour or fears which prevents conservative care being came out
Other	If you feel your reasons for extracting a tooth are not encompassed by the above categories, please state your reasons

Table 1: Extraction inclusion criteria.

Data were entered and analyzed by Statistical Package for Social Sciences version 20 software (SPSS, Chicago, USA). Frequencies, percentages, and Chi-square test were carried out, considering the significant level as 0.05.

Results

A total of 450 questionnaires were collected during one and a half educational semesters. From these, 57 questionnaires were excluded due to insufficient data entry, yielded a total sample size of 393 questionnaires — a total of 895 teeth were extracted from 385 patients. This yielded a response rate of 87%. Majority of the extractions were performed on patients between 35 and 50 years old. Males tended to extract teeth more than females (Table 2).

Age/ gender	Male		Female	
	Patients n (%)	Teeth n (%)	Patients n (%)	Teeth n (%)
6-12	1 (0.4%)	1 (0.001%)	0 (0%)	0 (0%)
13-17	5 (1.9%)	5 (0.007%)	7 (5.6%)	11 (4.7%)
18-34	96 (36.9%)	157 (23.7%)	35 (28%)	63 (26.9%)
35-50	99 (38.1%)	326 (49.3%)	54 (43.2%)	107 (45.7%)
>50	59 (22.7%)	172 (26%)	29 (23.2%)	53 (22.6%)
Total	260 (100%)	661 (100%)	125 (100%)	234 (100%)

Table 2: Distribution of extracted teeth and patients according to age and gender.

The most common cause of tooth extraction was dental caries (58%), followed by periodontal disease (21%), whereas the least cause was trauma/jaw fracture (Figure 1).

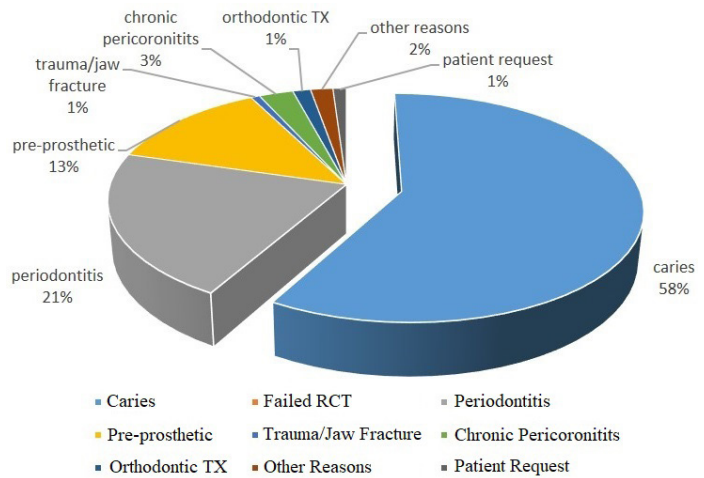


Figure 1: The distribution of reasons of tooth extraction among collected sample.

Table 3 showed that most of the extractions were performed due to caries in both age categories (79.5% in patients < 35 years and 65.1% in patients > 35 years). Patients under 35 years tended to extract their teeth due to failed root canal treatment less than patients above 35 years (42.1%, 57.9%, respectively). On the other hand, older patients extracted their teeth due to periodontal disease more than younger patients (15.8% vs 84.2%, respectively). The relationship between age and reasons for extraction found to be statistically significant (P-value < 0.000).

Reason of extraction/ age	<35 years n (%)	>35 years n (%)	Total N (%)	Chi-square	df	p-value
Dental caries	175 (34.7%)	329 (65.3%)	504 (100%)	23.844	3	0.000*
Failed root canal treatment	16 (42.1%)	22 (57.9%)	38 (100%)			
Periodontitis	29 (15.8%)	154 (84.2%)	183 (100%)			

Table 3: Relationship between the three most common reasons for extraction and age. * = statistically significant.

Based on tooth type, extraction frequencies are presented in table 4. The most commonly extracted teeth were maxillary molars due to caries, whereas anterior maxillary teeth were least extracted because of dental caries (64.8% vs 29.2%). Regarding periodontal disease, lower anterior teeth were the most extracted teeth compared to maxillary premolars that were the least extracted (39.6% vs 14.8%). In addition, it had been found that mandibular premolars were the least teeth extracted due to failed root canal treatment compared to mandibular molars, which were the most teeth type extracted due to failed root canal treatment (0.9% vs 4.9%).

Reason of extraction/ tooth type	Molars n (%)		Premolars n (%)		Anteriors n (%)	
	Maxilla	Mandible	Maxilla	Mandible	Maxilla	mandible
Dental caries	140 (64.8%)	137 (67.1%)	88 (59.4%)	53 (48.1%)	56 (46.6%)	31 (29.2%)
Failed root canal treatment	10 (4.6%)	10 (4.9%)	7 (4.7%)	1 (0.9%)	8 (6.6%)	2 (1.8%)
Periodontitis	32 (14.8%)	30 (14.7%)	22 (14.8%)	28 (25.4%)	29 (24.1%)	42 (39.6%)
Pre-prosthetic treatment	9 (4.1%)	16 (7.8%)	16 (10.8%)	21 (19%)	26 (21.6%)	24 (22.6%)
Trauma	0 (0%)	0 (0%)	4 (2.7%)	1 (0.9%)	0 (0%)	1 (0.9%)
Chronic periocoronitis	13 (6%)	0 (0%)	4 (2.7%)	2 (1.8%)	0 (0%)	4 (3.7%)
Orthodontic	2 (0.9%)	4 (1.9%)	3 (2%)	2 (1.8%)	1 (0.8%)	0 (0%)
Other reasons	4 (1.8%)	6 (2.9%)	1 (0.6%)	2 (1.8%)	0 (0%)	2 (1.8%)
Patient request	5 (2.2%)	1 (0.4%)	3 (2%)	0 (0%)	0 (0%)	0 (0%)
Total	216 (100%)	204 (100%)	148 (100%)	110 (100%)	120 (100%)	106 (100%)

Table 4: Numbers and frequencies of extracted teeth based on tooth type and reason for extraction.

Comparing gender (Figure 2), males extracted their teeth more than females, mainly due to caries and periodontal disease. On the other hand, females extracted teeth more for orthodontic treatment (0.1% vs 4.6%, respectively). However, this difference was not statistically significant (Table 5).

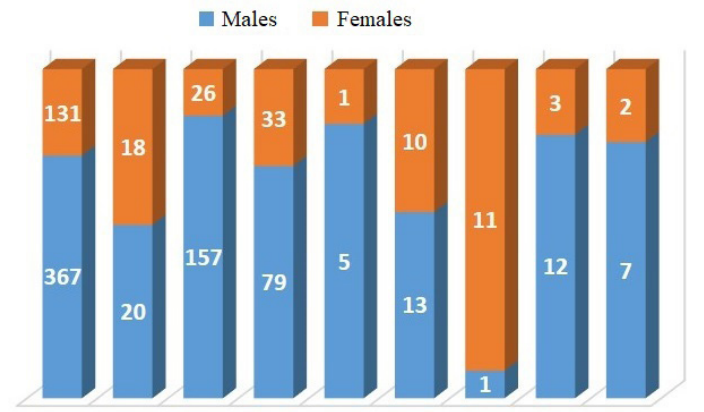


Figure 2: The frequencies and percentages of reasons of teeth extraction according to gender.

Reason of ex- traction/gender	Males n (%)	Females n (%)	Chi- square	df	p-val- ue
Dental caries	367 (73.7%)	131 (26.3%)	2.241	3	0.52
Failed root canal treatment	20 (52.6%)	18 (47.4%)			
Periodontitis	157 (85.8%)	26 (14.2%)			

Table 5: The relationship between gender and the three most common reasons for teeth extraction.

Discussion

Several studies had been conducted worldwide to investigate different reasons for tooth loss [18,24,25]. This is the first study performed in a private hospital setting in the Kingdom of Saudi Arabia, assessing the different reasons for teeth extraction. In the current study, caries and periodontal disease were the most common causes of teeth loss. This is in agreement with studies conducted in Kuwait [18], India [24], and Greece [6]. On the other hand, trauma was the least reason for tooth loss. This is in accordance with the literature [13,25].

Based on age, dental caries was the primary cause of tooth loss regardless of the age group. This is similar to previous studies [6,24,25]. The current data showed that the pattern of tooth loss differs among young and old individuals. Patients older than 35 years old extracted their teeth due to periodontal disease more than younger patients. This is similar to the results found by Dixit et al. [26] and Murray et al. [4].

When considering the tooth type, maxillary molars were extracted mostly due to caries, whereas mandibular anterior teeth were extracted more frequently due to periodontal disease. A study conducted in Kuwait by Al-Shammari K et al. [18] found similar results. On the contrary, Anand P. & Kuriakose, S. [24] indicated that mandibular first molars were most commonly extracted due to

caries. This can be explained by the fact that the first molars were the first permanent teeth to erupt [27]. On the other hand, in the current findings, mandibular anterior teeth were mostly extracted due to periodontal disease. This may be due to the anatomy of lower anterior teeth that leads to faster compromise with similar clinical attachment loss compared to multiple rooted teeth [27].

Regarding gender, males extracted their teeth more frequently than females in all categories except for orthodontic treatment. This can be explained by the fact that females visited the dentist more than males and care more about aesthetics [28]. Although this finding was not statistically significant in the current study, several studies found similar findings [6,28].

Few studies were conducted in the Kingdom of Saudi Arabia, these either carried out a long time ago, included different population, or had different aspects of comparison [7,13,19-23,25]. Based on the progressive alternation and the development of the country, enormous changes had been carried out in educational, cultural, and social levels. In addition, the involvement of social media closes the gap between the dentists and the patients. Patients are more aware of oral health and the importance of preserving teeth for a better quality of life. However, when comparing the patterns of tooth loss between the current study and previous studies conducted in the Kingdom of Saudi Arabia, the pattern of tooth loss had not been changed. Dental caries, followed by the periodontal disease, were the most common causes of tooth loss in all previous studies as well as the current study [7,13,19-25,25]. When assessing the actual percentage, on the other hand, for caries, it had been found that the percentage decreased from 62% to 26% from 1992 till 2015 [7,13,19,25]. The current finding showed increased in that percentage, reaching up to 58%. Regarding the prevalence of the periodontal disease, there is a similar reduction in the percentage from 19% to 8% [7,13,19,25]. However, our data showed a raised percentage reaching 21%. This may be due to an overrepresentation of specific age group, tooth type, different population, or different attitude from the patient or the dentist toward the preservation of the teeth [18]. It should be emphasized that oral health campaigns and health promotion are needed to lower the percentage of tooth loss to keep up with these changes in all sectors of the country.

The limitations of this study included the involvement of one private dental school. A multicentre study is needed to confirm the findings. In addition, the heterogeneity of the population, different methods of assessment of tooth loss, and the nature of dental caries and periodontal diseases need to be considered.

Conclusion

Although there are several causes of tooth loss, dental caries and periodontal diseases are still considered the majors among them. The periodontal disease accounts for the higher percentage of tooth extractions in older patients compared to a younger population. In addition, male patients extracted their teeth more frequently than female patients. Therefore, there is an urgent need to focus on the

prevention and treatment of dental caries and periodontal diseases in order to maintain functional and healthy teeth throughout life.

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