Original article

Causes and Patterns of Dental Extraction in Dental College of Sebha University

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ABSTRACT

Objectives: This study aimed to identify the primary cause of permanent teeth extraction among patients attending the Oral and Maxillofacial Surgery (OMFS) department of dental college, Sebha University, and its correlation with age, gender, and tooth type.

Methods: A cross-sectional study was conducted over ten months; and included 509 patients aged 16-90 years, who underwent tooth extraction. Variables studied were the patient's age, gender, tooth type, and extraction cause. SPSS was used for data analysis, and Chi-Square and ANOVA tests were used to evaluate variables associated with the cause of tooth loss. A *p*-value of less than 0.05 was considered statistically significant.

Results: Overall, 509 permanent teeth were extracted, males (62.1%) and females (37.9%). The primary reasons for tooth extraction were dental caries (76.62%), mobility (10.80%), prosthodontics (6.86%), orthodontics, and impaction (2.95%). The most common age group was 36-45 years (24.36%) and 26-35 years (23.38%). The highest percentage of tooth extraction was in the third and first molars (29.1% and 24.4%, respectively), and the lateral incisor (1.77%) was the lowest. There was an insignificant association between the cause of extraction and gender; a significant association between the cause of extraction and age $p<0.001$; and a significant association between (gender and age) with tooth type $p< 0.001$.

Conclusion: dental caries was the main reason for tooth extraction in OMFS department, dental college, Sabha University.

Keywords: *Tooth extraction, Dental caries, Mobility, Impaction, Sebha University*.

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INTRODUCTION

Tooth extraction is one of the most performed dental treatments worldwide. Due to the advancements in conservative, preventive and cosmetic dentistry, the teeth loss percentage has decreased. However, there are still various causes that lead to the extraction of teeth. These causes may be dental caries and its sequel as pulpitis and periapical infections, periodontal disease, orthodontic treatment, endodontic failures, prosthetic procedures, and trauma.[1,2] Early tooth loss has various harmful effects on an individual, such as impairment of masticatory function, unpleasant aesthetics, temporomandibular joint dysfunctions, psychological issues, social withdrawal, and decrease in self-confidence.[3]

Identifying the causes of tooth extraction is the first step in assessing the health needs to inform dental health policies. So, several studies have been carried out worldwide to determine the reason for tooth extraction.[4,5,6] Consequently, the leading cause of permanent tooth extraction in many countries was dental caries, followed by periodontal disease.[7, 8, 9,10] However, different contextual factors can affect the provision and uptake of oral health services.[11] Libya is a country that endures several political, economic and armed conflicts which appear to have impacts on oral health.[12,13] In addition, just two studies have been published that evaluated the reason and pattern of tooth loss and both of them were conducted in the east of Libya.[14,15] Hence, the data on this topic is not enough in Libya, and more information is strongly required about the southern province. Therefore, this study aimed to assess the cause and pattern of tooth extraction in permanent teeth among the Libyan population.

MATERIALS AND METHODS

This cross-sectional study was carried out at the Department of OMFS of Dental College, Sebha University. The outpatients undergoing extraction at the surgical department were included from March

2021 to December 2021, where a total of 509 extractions were performed. Participation was voluntary and all patients were asked for their consent by signing a permission sheet to be included in the study. Internship students filled record sheets, and all procedures were done under the supervision and control of a surgeon specialist. Dentists were asked to explain the information sheet to the patients and record the code of tooth type and the leading cause for each tooth extraction. The following variables were recorded and evaluated for the study population: age, gender, tooth type, and reason for extraction. For accuracy, every reason for tooth extraction recorded in the sheet was defined as; (1) Caries: caries or its sequels, remaining root, and tooth fracture by caries. (2) Mobility: due to periodontal disease, periodontal abscess, and loss of tooth function. (3) Prosthodontic reason: to make denture removable or fixed functionally fitting. (4) Orthodontic reason: correction or prevention of malocclusion. (5) Impaction: tooth unerupted complete, or partial. The sampling technique was non-probability convenient sampling. All extractions carried out with full details, age above 16 years, permanent teeth, and all procedures done under supervision were included. Patients with incomplete details, ages below 16 years, medically compromised patients, and deciduous or supernumerary teeth were excluded.

The data were entered and analyzed using the SPSS software (version 16). The Chi-Square test was performed on the association between gender, cause of extraction, and type of tooth. Pearson chi-square and *p*-value (<0.05) were calculated to assess group associations. The ANOVA test evaluated the relationships between age groups, cause of extraction, and type of tooth extracted. The mean difference and *p*-value were recorded.

RESULTS

Out of 190 questionnaires distributed among A total of 509 dental extractions were included in this study (316 males and 193 females). Among the study population, most tooth extractions were 36-45 years (24.36%) and 26-35 years (23.38%). The participants aged from 16 to 90 years, with a mean of 41.35 (14.17); 38.1% were males at a mean of 43.85 (14.76), and 61.9% were female at a mean of 39.81 (13.59) **(Table 1)**.

The third molar noted the highest percentage of tooth extraction, then the first molar (29.1% and 24.4%, respectively), and the lateral incisor (1.77%) was the lowest. Dental caries was the primary cause of tooth extraction (76.62%), while tooth mobility was responsible for only (10.80%), followed by orthodontic and impaction purposes of extraction 2.9% for each cause **(Table 1)**.

Table 1: Distribution of patients who undergone extractions according to age, gender, causes, and tooth type.

Variable	Frequency	Percentage	Age (Mean±SD)
Age			
< 20	73	14.43 %	41.35± 1.41
20-29	119	23.38 %	
30-39	124	24.36 %	
40-49	111	21.80 %	
50-59	49	9.62 %	
> 60	33	6.8 %	
Gender			
Male	316	62.1 %	43.85±14.76
Female	193	37.9 %	39.81±13.59
Causes of extraction			
Mobility/ Periodontal disease	55	10.80 %	
Caries	390	76.62 %	
Ortho	15	2.95 %	
Prosthodontics	34	6.68 %	
Impaction	15	2.95 %	
Tooth type			
Central incisor	12	2.36 %	
Lateral incisor	9	1.77 %	
Canine	21	4.12 %	
First pre-molar	57	11.20 %	
Second pre-molar	56	11 %	
First molar	124	24.36 %	
Second molar	82	16. 11 %	
Third molar	148	29. 08 %	
Total	509	100 %	

Association between gender and cause of extraction

A Chi-Square test was conducted to analyze the association between the extraction cause and gender. There is an insignificant association between gender and the cause of extraction (*p*- value=0.069) **(Table 2)**. Dental caries was the main reason for tooth extraction in females (65.2%), while in males was 34.8%. However, the male patients had more tooth extraction due to severe mobility and prosthodontics (51.9% and 50.0%) respectively. On the other hand, the impaction reason for tooth extraction was higher in females (60%) than males (40%), while the prosthodontics cause was equal in males and females (50%) **(Table 2)**.

Table 2: Distribution of extraction cause according to gender

Cause of extraction	**Gender**		**Chi-square**	***p*-value**
	Male N (%)	Female N (%)		
Caries	136 (34.8%)	255 (65.2%)	8.685	0.069
Mobility	28 (51.9%)	26 (48.1%)		
Orthodontics	7 (46.7%)	8 (53.3%)		
Prosthodontics	17 (50%)	17 (50%)		
Impaction	6 (40%)	9 (60%)		

p-value level <0.05

Association between age and cause of tooth extraction

The extraction due to dental caries was at a mean age of 38.7±11.97, while the mobility cause was at a mean age of 56.03±9.45. Additionally, the extraction for the orthodontics and the prosthodontics were at a mean age of 20.66±4.06, and 61.02±11.32 respectively. Furthermore, the mean age of impaction reason for extraction was 32.20±11.36. The result indicated that the extraction for mobility and prosthodontics was more common among older participants (56 and 61 years, respectively). In comparison, dental caries and orthodontics cause were among young participants (38 and 20 years, respectively) **(Table 3)**.

Table 3: The mean age and relationships with cause of extraction

Cause of extraction	**N**	**Age= Mean ±SD**
Caries	391	38.75± 11.97
Mobility	54	56.03± 9.46
Orthodontic	15	20.66 ±4.06
Prosthodontics	34	61.02 ±11.33
Impaction	15	32.20± 11.37

Relation between the type of extracted tooth and gender

Chi-square statistics were used to analyze the association between gender and the number of extracted teeth. There is a significant association between gender and type of extracted tooth (*p*-value<0.001). The third molar was the most commonly extracted tooth among males (90.5%), followed by the second premolar tooth (58.6%). At the same time, in females, data showed a distinct difference from males as the central incisor and the first molar was only extracted (100%). In addition, extraction of canine and first premolar was higher in females than in males (95.2% and 96.2%, respectively) **(Table 4)**.

Table 4: Distribution and association between tooth type and gender

Tooth type	Gender		Total	Pearson Chi-square	*p*-value
	Male	Female			
Central incisor	0%	100%	100%	3.107	0.000
Lateral incisor	22.2%	77.8%	100%		
Canine	4.8%	95.2%	100%		
First premolar	3.5%	96.5%	100%		
Second premolar	58.9%	41.1%	100%		
First molar	0%	100%	100%		
Second molar	26.8%	73.2%	100%		
Third molar	90.5%	9.5%	100%		

p-value level < 0.05

Relation between extracted tooth type and age

The relationship between age and type of extracted tooth was measured by Univariate analysis of variances (ANOVA test). The results show a significant association between age and type of extracted tooth (*p*-value<0.001). The anterior tooth was extracted most commonly among young participants (central incisor 33 years, lateral incisor 35 years, and canine 36 years of age). In comparison, the premolars were frequently extracted among middle-aged participants (first premolar 44 years and second premolar 45 years of age). The first molar was extracted mainly among young participants (34 years). The second and third molars were extracted frequently at age 43 and 44, respectively **(Table 5)**.

Table 5: The mean age and relation with tooth extracted type

Extracted tooth type	N	Age= Mean± SD	ANOVA test F	*p*-value
Central incisor	12	33.00± 9.98	7.992	0.000
lateral incisor	9	35.22± 12.42		
Canine	21	36.28± 17.02		
first premolar	57	44.19 ±12.81		
second premolar	56	45.96± 16.81		
first molar	124	34.95 ±8.65		
second molar	82	43.51 ±13.73		
third molar	148	44.45 ±15.27		

p-value level <0.05

The causes of tooth extractions among individual tooth type

Descriptive analysis was conducted to examine the reason for extraction for each tooth type individually. The result indicated that the participants only extracted the central incisor, lateral incisor, canine, first premolar, and first molar due to dental caries. The second molar was frequently extracted because of

dental caries (72.0%), then mobility as the second common cause (14.6%). In addition, dental caries was the leading cause of extraction of the second premolar (48.2%), followed by mobility (35.7%). Finally, dental caries accounted for 55% of the extracted third molar and approximately 15% for mobility and prosthodontics reasons. Overall, the result observed that dental caries was the most common cause of tooth extraction, whereas mobility was considered the second reason among the participants **(Table 6)**.

Table 6: Distribution of tooth types with cause of extraction

Tooth	Cause of extraction					Total
	Caries	Mobility	Orthodontic	Prosthodontics	Impaction	
Central incisor	100%	.0%	.0%	.0%	.0%	100%
Lateral incisor	100%	.0%	.0%	.0%	.0%	100%
Canine	100%	.0%	.0%	.0%	.0%	100%
First premolar	100%	.0%	.0%	.0%	.0%	100%
Second premolar	48.2%	35.7%	5.4%	10.7%	.0%	100%
First molar	100%	.0%	.0%	.0%	.0%	100%
Second molar	72.0%	14.6%	6.1%	7.3%	.0%	100%
Third molar	55.4%	14.9%	4.7%	14.9%	10.1%	100%

DISCUSSION

The result of our study indicated that dental caries and its sequelae were the first common cause of tooth extraction (76.62%). Mobility was the second most common cause of tooth loss (10.80%). The current finding that caries was the leading cause agrees with previous Libyan studies[14,15] and several studies conducted worldwide.[16,17,18] On the other hand, the present study findings differ from reports of other studies, which showed that dental caries and periodontal diseases were almost the leading cause of tooth extraction.[19,20] On the contrary, some studies in Japan, Singapore, and Canada mentioned that periodontal disease was the principal reason for tooth extraction.[20,21,22] These differences may be associated with socioeconomic factors and level of dental awareness, such as fluoride use in these countries.[21,20]

In addition, our study noted that tooth extraction due to dental caries was higher among females (76.62%) than males (34.8%), which was in accordance with the previous studies conducted in South Africa, Nigeria, and Saudi Arabia.[23,24,25] Interestingly, the high incidence of dental caries in females more than in males may reflect that females are more likely to excessively use sugary foods, which is the primary reason for dental caries. Furthermore, lack of dental health education and limited dental care access in some regions can be another reason for rising dental caries prevalence. However, this suggestion requires further assessment and more study in the Libyan context.

Other findings in the present study agreed with various studies' results that the impaction and orthodontic reasons were rare conditions as the cause of tooth extractions.[26,27,28] Most tooth extraction for impaction reasons was carried out in this study at ages 20-29. It was similar to the study result conducted by Sahibzada.[7] It could be the case that the current study was conducted in educational institutions and hence the patients prefer to go to specialists for such procedures. Further research is needed to clearly understand this observation.

Our study demonstrated that dental caries and orthodontic factors are the principal cause of tooth extraction in young patients 20-38 years, while mobility and prosthodontics factors were more in older patients 50-70 years. Thomas and Al-Maqdassy also presented the same findings.[27] Nevertheless, the current result in our study and the previously mentioned study is inconsistent with many studies that reported periodontal disease was the leading cause of tooth loss in patients over 40 years.[20,21,28,29] In other words, if more teeth are conservative and restored instead of extracted, the extraction will be delayed to an older age group, this may reflect the extraction reduction due to dental caries, and most teeth are extracted for the periodontal cause.

In the current study, the most regularly extracted teeth were the third molar and first molar (29.1%, and 24.4%, respectively); this result was consistent with studies conducted by Thomas and Al-Maqdassy and Marcus et al. in the USA, third molars were the most frequently extracted teeth.[27,30] Surprisingly, dental caries in anterior teeth, first premolar, and first molar were the principal reasons for tooth extraction (100%) in all participants. The possible causes of early extraction of anterior teeth and first premolar and molar could be due to lack of prophylactic measures such as fissure sealants to protect the tooth from caries, poor eating habits such as excessive intake of sweets and candies, improper brushing techniques, lack of dental visits and poor oral hygiene. However, the results are inconsistent with other studies that mentioned that periodontal factors and prosthodontics were the leading cause of loss of anterior teeth.[24,26,31,32] The possible reason for the high periodontal extraction in anterior teeth is that this tooth is less susceptible to caries and preserved longer in the mouth by restoration.[24]

The present study could be affected by some limitations such as the short duration and the type of study design that included one institution. However, it gives an idea of the reasons for tooth extraction in the Libyan south. According to our surprising result in this study, it is recommended that should be needed for the actual implementation of preventive oral health care programs. An increase in public awareness about dental health will decrease the high-frequency incidence of dental caries among the Libyan population and retain the tooth in the oral cavity for a long time. Additionally, further study will provide enough information to plan an adequate strategy to reduce early tooth loss due to dental caries and changes in harmful dietary habits of the individuals and negatively affect the general health, oral health, and their related quality of life.

CONCLUSION

In conclusion, the main cause of teeth extraction among dental college patients remains dental caries in both young and old individuals. There is no difference in the cause of extraction between genders, whereas the type of extraction was different between males and females. Females are more prone to anterior extraction than males. Age is another factor associated with the type of tooth extraction and cause of extraction, which shows young individuals are subjected to more anterior extraction and commonly related dental caries. Therefore, dental caries is still the main reason for tooth extraction among the Libyan population, despite the evolution in technology used in dentistry and the increased number of dental clinics and practitioners in Sabha city in Libya.

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