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Reasons for Tooth Extraction in Patients Attending the Specialized Dental Center in Medina

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ABSTRACT

Objective: This study investigated the reasons for tooth extractions among Saudi patients attending a dental institution and evaluated these causes in relation to demographic factors.

Materials and Methods: A cross-sectional descriptive study was conducted at the Dental Specialized Center in Medina, Saudi Arabia. The study included 1,866 patients (898 males and 968 females) who underwent tooth extractions between January 2021 and December 2023. Data collected included patient demographics and reasons for extraction, categorized into six groups. Statistical analysis was performed using the Statistical Package for the Social Sciences version 23.

Results and Discussion: Of the 1,866 participants, 51.9% (n = 968) were female and 48.1% (n = 898) were male. The predominant age group was 21–30 years (27.65%). Dental caries was the primary reason for extraction (62.6%, n = 1,168), with a higher prevalence among females (56.0%) compared to males (44.0%). Periodontal disease was the second most common cause (16.9%, n = 315), predominantly affecting males (62.2% vs. 37.8% in females).

Conclusion: Dental caries remains the primary cause of tooth extraction in Saudi patients, followed by periodontal disease, with distinct age and gender-related patterns.

Keywords: Dental caries, extraction, periodontal disease, Saudi Arabia

Introduction

Tooth extraction remains a significant and often unavoidable dental intervention for compromised teeth, despite advances in conservative dentistry. Studies consistently show that it continues to be one of the most frequently performed dental procedures globally.[1] Although modern dentistry emphasizes preservation of natural teeth, extraction becomes necessary in cases of severe dental pathology. The primary indications for extraction include dental caries, periodontal disease, impaction, pathological conditions, and trauma. Notably, the two leading causes – dental caries and periodontal diseases – are largely

preventable through proper oral hygiene practices and regular dental care.[2,3]

Global epidemiological studies have consistently identified dental caries as a primary cause of tooth extraction. A 5-year longitudinal study in Greece[2] reported that 45.7% of tooth loss was attributed to dental caries. Similarly, research in Libya found caries to be responsible for 55.9% of extractions.[3] This pattern has been observed across diverse geographical regions, including Tanzania,[4] Pakistan,[5] Kuwait,[6] Iran,[7] Taiwan,[8] Italy,[9] Japan,[10] Canada,[11] France,[12] and in the United States.[13] Similar findings were reported in the Eastern region of Saudi Arabia, where two studies have reported that dental caries as the main cause of dental extractions.[14,15]

Periodontal disease typically presents as the second most frequent reason for tooth extraction, particularly among older adults. Studies from various countries have demonstrated its significant impact. In Libya, 34.42% of extractions were attributed to periodontal diseases,[3,16] while Japanese research reported 40.4% of extractions due to periodontal problems, predominantly in patients aged 55 and above.[10,17] Similarly, in Kuwait,[6] periodontal disease was the main reason for dental extraction among patients 40 years and older. Several studies conducted in Germany,[18] Greece,[2] Jordon,[19] and Canada[20] identified periodontal disease as the main reason for tooth loss in seniors.

The current dental literature lacks any recent investigation of reasons for teeth extraction in Medina City.

This study aims to investigate the reasons for the primary reasons for tooth extraction among Saudi patients attending the Specialized Dental Center in Medina, and how are these reasons associated with age and sex. The findings may help in the process of creating public health initiatives in Saudi Arabia to prevent the loss of teeth, particularly programs that involve concentrated prevention.

Materials and Methods

Ethical approval

The study protocol was approved by the Ministry of Health IRB (IRB-00000).

Study sample

A cross-sectional descriptive study was conducted at the Dental Specialized Center in Medina, Saudi Arabia, from January 2021 to December 2023. The study included Saudi patients aged 10 years and older who underwent permanent tooth extraction. The records of all patients who visited the clinic in the designated period were reviewed. Inclusion criteria required complete demographic data and documentation of extraction reasons. Patients who underwent primary tooth extraction or had incomplete records (missing essential demographic data (age or sex) or without clear documentation of the reason for tooth extraction) were excluded.

Data collection methods

Trained dental professionals collected demographic data (age and sex) and related clinical information retrospectively from the electronic medical record system of the specialized Dental Center in Medina. Reasons for extraction were categorized into six standardized groups: dental caries, periodontal diseases, orthodontic reasons, eruption problems, trauma, and others. Diagnostic criteria for each category were established before data collection to ensure consistency.

Statistical analysis

Data analysis was performed using the Statistical Package for the Social Sciences version 23.0 (IBM Corp., Chicago, IL, USA). Descriptive statistics were calculated for demographic variables and extraction causes.

Results

The study sample comprised 1,866 patients, with a slightly higher proportion of females (51.9%, n = 968) compared to males (48.1%, n = 898). The mean age was 38.0 years (standard deviation = 16.2, range: 11–95 years). The age distribution showed a predominance of young adults, with 27.65% falling within the 21–30-year age group.

Dental caries was the primary reason for extraction (62.6%, n = 1,168), showing a higher prevalence among females (56.0%) compared to males (44.0%). Periodontal disease emerged as the second most common cause (16.9%, n = 315), with a notably higher occurrence in males (62.2%) than females (37.8%). The rates of tooth extraction by sex (male and female) with frequency and percent of each cause are shown in Table 1. The distribution of cases according to sex, cause, and age group is shown in Table 2. Table 3 displays the distribution of the extractions according to tooth type and cause.

Discussion

This cross-sectional study investigated the patterns and reasons for tooth extraction among Saudi patients, revealing dental caries as the predominant cause (62.6%), followed by periodontal disease (16.9%). These findings align with previous regional and international studies while highlighting specific demographic patterns in the Saudi population.

The predominance of dental caries as the primary cause of extraction (62.6%) aligns with the documented high prevalence of dental caries in the Saudi population.[21,22] Also correlate well with previous Saudi studies conducted in Al Jouf city (70%),[23] Abha city (68.1%),[24] and Al-Baha city (53%).[14] Similar patterns have been reported in studies from Libya,[16] Kuwait, Japan,[10] Pakistan,[5] Brazil,[25] Italy,[9] Iran,[7] and Greece,[2] suggesting a consistent global trend.

Our finding that females experienced more caries-related extractions (56%) compared to males (44%) corresponds with global trends.[2,26] The highest prevalence occurred in the 21–30 age group, consistent with international patterns, likely due to the combination of age-specific dental decay patterns, inadequate oral hygiene practices, and excessive sugar consumption, supporting Fure's findings regarding caries patterns among young adults.[27]

Periodontal disease emerged as the second most common cause of extraction (16.9%), notably lower than rates reported in some international studies. For comparison, research from Germany reported 27.3% of extractions due to periodontal disease, with similar findings in Greece,[2] Canada,[28,29] and Jordan.[19] This variation may be attributed to demographic differences, particularly the aging populations in these countries, and the widespread use of water fluoridation in regions such as Canada and Jordan.[30]

Male patients demonstrated a higher rate of periodontal disease-related extractions (62.2%), correlating with Al-Shammari *et al*.'s[31] findings. This gender disparity likely reflects higher periodontal disease risk among males, potentially influenced by factors including smoking habits, oral hygiene practices, and dental care utilization patterns.

Nevertheless, significantly higher extraction rates caused by periodontal pathology, particularly in middle-aged and older individuals, underline the necessity for improving periodontal care programs for patients of this age.[31] The pattern of molar extractions, most frequently third molars, is also comparable with the research done in other countries such as Iran and Pakistan.[5,32] Our data show that periodontal disease was the main reason for extraction of incisors. These findings are in line with Alhadi *et al*. in Yemen,[26] Suzuki *et al*.[10] in Japan, and Corbet and Davies in Hong Kong.[33]

Table 1: Cause of tooth extraction by gender

Cause	Gender				Total (%)
	Male		Female		
	No.	Percentage	No.	Percentage	
Caries	514	44.0	654	56.0	1168 (62.6)
Periodontal	196	62.2	119	37.8	315 (16.9)
Eruption	112	49.8	113	50.2	225 (12.1)
Orthodontic	60	42.9	80	57.1	140 (7.5)
Trauma	11	84.6	2	15.4	13 (0.7)
Other	5	100.0	0.0	0	5 (0.3)
Total	898	48.1	968	51.9	1866 (100.0)

Table 2: Tooth extraction cause according to age group and gender

Age group	Sex	Cause						Total
		Caries	Periodontal	Orthodontic	Eruption	Trauma	Others	
10–20	M	46	5	13	48	6	3	121
	F	65	0	10	41	0	0	116
21–30	M	103	20	84	12	2	0	221
	F	151	25	78	39	2	0	295
31–40	M	84	29	11	0	3	2	129
	F	170	38	19	0	0	0	227
41–50	M	125	46	4	0	0	0	175
	F	115	11	2	0	0	0	128
51–60	M	69	36	0	0	0	0	105
	F	94	29	3	0	0	0	126
61–70	M	65	43	0	0	0	0	108
	F	48	16	1	0	0	0	65
>70	M	22	17	0	0	0	0	39
	F	11	0	0	0	0	0	11
Total		1168	315	225	140	13	5	1866

M: Male, F: Female

Table 3: Tooth extraction by tooth type and cause

Tooth type	Cause						Total	
	Caries	Periodontal	Eruption	Orthodontic	Trauma	Other	No.	%
Central incisor								
Max	13	30	0	0	10	1	54	2.89
Mand	12	38	1	0	0	0	51	2.73
Lateral incisor								
Max	18	35	0	1	3	0	57	3.05
Mand	15	40	0	0	0	0	55	2.95
Canine								
Max	24	25	8	2	0	0	59	3.16
Mand	21	17	2	0	0	0	40	2.14
1st PM								
Max	105	18	2	43	0	0	168	9.00
Mand	40	18	2	32	0	0	92	4.93
2nd PM								
Max	89	14	0	2	0	0	105	5.63
Mand	69	14	11	5	0	0	99	5.31
1st M								
Max	161	14	1	1	0	0	177	9.49
Mand	154	15	2	6	0	0	177	9.49
2nd M								
Max	110	15	1	0	0	0	126	6.75
Mand	94	6	1	0	0	0	101	5.41
3rd M								
Max	127	9	72	22	0	1	231	12.38
Mand	116	7	122	26	0	3	274	14.68
Total	1168	315	225	140	13	5	1866	100%

Concerning the type of extraction, 7.5% of them were orthodontic extractions. Our results correlate with previous studies indicating an increased prevalence of orthodontic treatment needs among adolescents. A study conducted among Jordanian patients[34] has found that the extraction for orthodontic reasons was high among female patients, which is expected mainly due to psychological motives to get a good esthetic dentofacial appearance.

Third molars were the most frequently extracted teeth (maxillary: 12.38% and mandibular: 14.68%), followed by first molars (9.49% for both maxillary and mandibular). These findings align with studies from the United States[35,36] and Yemen,[26] where third molars were similarly identified as the most commonly extracted teeth, primarily due to dental caries. Notably, our data revealed that periodontal disease was the predominant cause for incisor extractions, consistent with findings from studies in Yemen,[26] Japan,[10] and Hong Kong.[33]

The age distribution analysis revealed that the 21–30-year group accounted for the highest percentage of extractions (27.65%), consistent with global trends. This pattern, as noted by McCaul *et al*.,[37] reflects the higher incidence of extractions for orthodontic and caries-related reasons among young adults. Conversely, the lower extraction rate (2.68%) observed in patients over 70 years likely reflects previous tooth loss or existing prosthetic restorations.

Orthodontic extractions comprised 7.5% of all cases, with a higher prevalence among female patients. This gender disparity aligns with previous studies of Saudi Arabian populations, potentially reflecting greater emphasis on dental esthetics among female patients.

When comparing the data given regarding the age distribution of extractions, the group of 21–30 years was most frequent (27.65%), which is relevant to the global tendencies. This trend is similarly seen by McCaul *et al*.,[37] who established that young adults had more extractions than older counterparts for orthodontic and caries reasons. The value obtained for the lower rate of extractions among older adults (>70 years) amounted to 2.68%, which, in view of previous studies that showed fewer extractions in this age group, probably due to previous tooth loss or prosthetic work such as dentures.

Limitations

The cross-sectional nature of this study restricts causal interpretations. In addition, its single-center design may limit the generalizability of the findings to other regions within Saudi Arabia. To overcome these limitations, further longitudinal studies with multicenter designs

are needed to more accurately evaluate the effectiveness of prevention strategies in reducing extraction rates.

Although the center is the main center in the city, not all extractions done are evaluated as other dental clinics perform extractions too. The economic status of patients included may not represent the community, as it is free of charge governmental center, and those with better economic status may prefer to approach private clinics.

A strength point of the study is that all patients' records visiting oral surgery clinics are evaluated for about 2 years.

Clinical implications

Caries is the main reason for extraction, and dental preventive programs should be directed toward addressing this problem.

Conclusion

This study demonstrates that dental caries remains the primary cause of tooth extraction in the studied Saudi patients, followed by periodontal disease, with distinct age and sex-related patterns. These findings emphasize the need for:

1. Enhanced preventive dental care programs, particularly targeting young adults
2. Sex-specific oral health interventions.
3. Improved periodontal care services for older adults.

Authors' Contributions

Abdulmoeen Alhejali: Conceptualization, validation, writing - review and editing, supervision. Ahmad Al-Fraidi: validation, formal analysis, writing - review and editing. Mohammed Alharbi: validation, formal analysis, investigation. Ahmed Zakour: methodology, investigation, resources. Mostafa Abdallah: data curation, writing - review and editing. Maissa Abdelfatah: data curation, writing-original draft preparation. Abdulrahaman Alsadai: resources, data curation. Khaled Alharbi: methodology, formal analysis, writing-original draft preparation. Ahmed Alhejaili: Conceptualization, methodology, writing-original draft preparation. All authors have read and agreed to the published version of the manuscript.

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Data Availability Statement

Not Applicable.

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Not Applicable.

Conflicts of Interest

The authors declare no conflict of interest.

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