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Reasons for Teeth Extraction in Governmental Hospitals in Madinah City, Saudi Arabia

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Abstract:*The aim of thisstudy is to investigate the primary reasons for teeth extraction in Madinah city, Saudi Arabia. Teeth extraction records for one year wereobtained from governmental hospitals in Madinah city. Each patient's gender, age, chronic medical conditions, teeth extracted, and reasons for extraction were recorded. A total of1,929 teeth were extracted in 949 patients, with an average of 2.03 teeth extracted per patient. Caries were responsible for89.8% of the teeth extractions;the percentage was the same amongboth male and female patients. The most common teeth extracted were the lower firstmolars. No relationshipwas shown between number of teeth extracted and any chronic medical condition investigated. Furthermore, age was associated weakly withthe number of extractions; only 0.7% of the teeth extractions can be explained by age. In conclusion, dental caries wasthe principalreason for teeth extractions in Madinah city, Saudi Arabia.*

Keywords: *Tooth extraction, Dental caries, Madinah, Saudi Arabia*

I. Introduction

Tooth loss is a public health problem worldwide [1]. Itmay affect speech, produce difficulties in mastication, and result in a poor appearance. It can lead to severe consequencesin the livesof any population [2]. With that in mind, the primary causes of tooth extractions bear investigation. Knowing the causesand preventing themwill helppeople maintain normaldentition for prolonged periods of time.

Many studies aroundthe globe addressthe causes of extractions. Most of the studies suggest the reasons are related to caries, periodontal disease, trauma, orthodontic treatment, and prosthodontics [3-5]. Many have found that caries is the primary reason for tooth extractions in young people [6,7]. Other studies maintain that caries and periodontal disease both share the responsibility for tooth loss [8,9],andstill otherresearchersfound thatperiodontal disease isthe primary cause of teeth extractions in elderly patients [7,10-12].

In Canada and Germany, studies reported periodontal disease as the primary cause of tooth loss [5,13]. In South Wales and Scotland, studies found that dental caries was the main underlying cause for tooth extractions [3,4]. However, in Singapore and Italy, periodontal disease and caries were to blame equally as the main reasons for tooth extractions [8,9].

The extraction of teeth isa fundamental measure of dental health; in this way, tooth loss in dentistry is analagous to mortality rates in other medical fields [14]. Examining the occurrence of extractions will give us a better understanding of the major factors contributing to tooth loss, which in turn will help us develop better ways to deal with them and reduce the rates of loss.

In Saudi Arabia and the Arabian Gulf countries, little researchhas been conducted on this problem [7,15-17]. No data specific to Madinah city was found in an investigation of existing studies. Therefore, the aim of the current study is to determine the main reasons forthe extraction of permanent teeth in Madinah city and investigate age, gender, and any chronic medical conditions that might be associated with these reasons.

II. Methods

Data for this cross-sectional study were collected from governmental hospitals in Madinah city. Data was from files of patients who attended the oral surgery clinics from January 1, 2015,to January 1, 2016. The criteria for inclusion were that patients had to be more than 10 years old and had to have permanent teeth indicated for extraction. Approval for the study was obtained from the Institutional Review Board and the General Director of the Dental Department in the General Directorate of Health Affairs in Madinah city. The sample collected was 949 patients in total, 497male and 452 female. The causes for extraction, number of teeth that were extracted, age of the patient, and any existing medical conditions were listed ona specially designed study form. The list of reasons for extraction used in previous studies [10-12] was modified. The reasons for teeth extraction were caries, periodontal disease, orthodontic treatment, prosthodontics, trauma, and patient request.

The data wereprocessed and analysed by SPSS (Statistical Package for Social Sciences, version 21), and the frequency distribution of variableswerecomputed separately. The chi-square test, independent t-test, simple liner progression test, and ANOVA (Analysis Of Variance) test were used accordingly.

III. Results

The data of this study were taken from 949 patient medical records between January 1, 2015,and January 1, 2016. The mean age of patients was 34.47 (standard deviation was 14.45). The total included 497 male participants (52.4%) and 452 females (47.6%). Table 1 shows the participants' medical history.

Table 1. The distribution of participants' medical conditions

Medical condition		**n (%)**
Diabetic	Yes	94 (9.9%)
	No	855 (90.1%)
Hypertension	Yes	72 (7.6%)
	No	877 (92.4%)
Asthma	Yes	26 (2.7%)
	No	923 (97.3%)
Epileptic	Yes	4 (0.45)
	No	945 (99.65)

From those participants, 1,929 permanent teeth were extracted with a mean of 2.03 (standard deviation is 1.69) teeth extracted per patient. Figure 1 is a bar chart illustrating the common causes for extraction of permanent teeth for the sample covered in this study. Caries was found to be the most common reason for extraction with (89.8%), followed by trauma (4.1%) and orthodontic treatment (1.9%). Extractions due to periodontal disease totalled 1.7%,andfor patient request, 1.4%. Prosthodontic treatment was the reason for 1.2% of extractions, the least frequent cause of extractions among the participants of the current study.

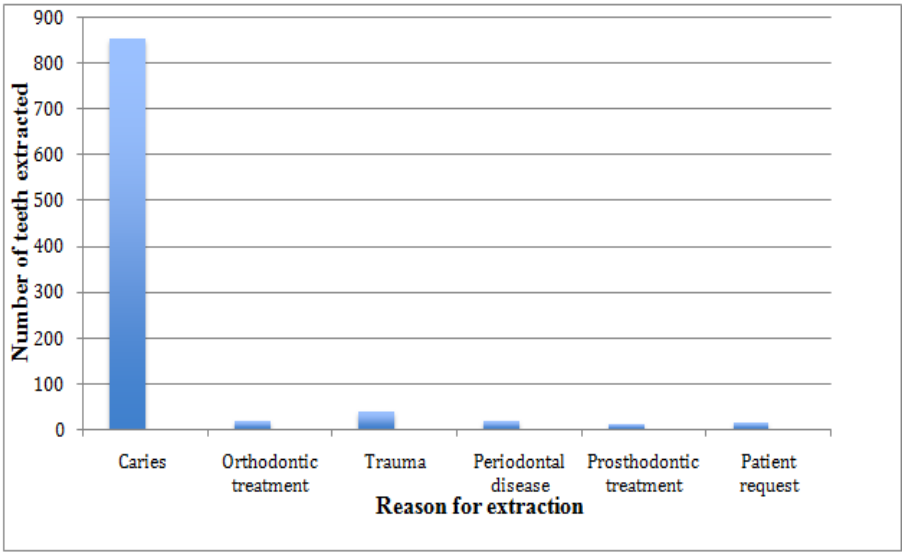

Figure 1. Frequency of the causes of permanent teeth extractions

Table2 below demonstrates the distribution of the extracted teeth (numbered according to the Universal Tooth Numbering System).

Table 2. Frequency of permanent teeth extraction by tooth number

Tooth number	Frequency	Percent
36	171	8.90%
46	141	7.3%
38	129	6.7%
16	126	6.6%
48	109	5.8%
26	105	5.4%
18	99	5.2%
28	95	4.9%
24	88	4.6%
17	86	4.5%
37	81	4.2%
14	78	4.1%
25	74	3.8%
27	74	3.8%
47	72	3.7%
35	53	2.7%
45	47	2.4%
34	43	2.2%
15	41	2.1%
44	33	1.7%
23	24	1.2%
13	22	1.1%
22	21	1.1%
12	17	0.9%
33	17	0.9%
21	16	0.8%
32	15	0.8%
43	14	0.7%
11	12	0.6%
41	10	0.5%
31	8	0.4%
42	8	0.4%

Table3 demonstrates the variation innumber of teeth extractedfromeach patient according to the variablesof gender, diabetes mellitus, hypertension, and asthma. Using the t-test, there was no association between the number of permanent teeth extracted andgender, diabetes mellitus, hypertension, or asthma. Epilepsywas not analysedas a variable due to the small number of patients in the sample with this condition.

Table3. The mean of teeth extraction of each patient accordingthe variables ofgender, diabetes mellitus, hypertension, and asthma

		Number of permanent teeth extracted	
		Mean (SD)	**p-value using t-test**
Gender	**Male**	2.08 (1.54)	
	Female	1.96 (1.85)	.328
Diabetes Mellitus	**Yes**	2.4 (2.0)	
	No	2 (1.65)	.057
Hypertension	**Yes**	2.27 (1.76)	
	No	2.01 (1.7)	.222
Asthma	**Yes**	1.73 (0.82)	
	No	2.04 (1.71)	.08

Using simple linear regression to compare teeth extractions and patient age, we found a significant relationship (p-value <0.01) and an R square value of 0.007. Using ANOVA, the number of teeth extractions was compared with reasons forextraction. This is detailed in Table 4. The p-value of the ANOVA test was .042, indicating a significant difference. Tukey's post hoc test results indicated that only the mean of teeth extracted due to caries was different fromteeth extracted due to prosthodontic treatment (mean difference = 1.63, p-value= 0.019). All other groups' p-valueswereabove 0.05.

Table4. The mean of teeth extraction for each reason forextraction

Reason fortooth extraction	**Number of the permanent teeth extracted Mean (SD)**
Caries	2 (1.63)
Orthodontic treatment	1.89 (1.23)
Trauma	2.05 (1.76)
Periodontal disease	2.5 (2.68)
Prosthodontics	3.64 (3.88)
Patient request	2.15 (1.34)

IV. Discussion

Our results indicate that the most common reason for extraction of permanent teeth is caries, followedin descending order by trauma, orthodontic treatment, periodontal disease, patient request, and prosthodontics. Our results are similar to the findings in previous literature forthe same Arabic region [7,15,16] and internationally [3,4],whichindicate that caries is the most common cause underlyingextraction. However, our percentage of permanent-tooth extraction due to caries was higher than that indicated in the previous studies. Also, all of the previous studies [3,4,7,15,16] indicated that periodontal disease was the secondmost common reason for extraction, which is different from our results. The reason forthis difference cannot be identifiedby our results. However, the reason for ourlow percentage of permanent teeth extracted due toperiodontal disease is that our data were retrieved from dental clinics in the major governmental hospitals, not the primary health care centresthatusually do extractions for periodontal reasons.

Our results also indicate that the lower firstmolars were the most common teeth extracted. This is similar to [7] in their study. For this reason, futureoral health hygiene campaignsshould focus on molars in younger patients, as they are the firstpermanent teeth to appear in the mouth, exposing them to longer use and

higher risk than anyof the other teeth. Also, this should encourage stakeholders to effectively implement a national program for fissure sealant for molars in young patients.

Our resultsindicate that the number of teeth extracted is not significantly different between males andfemales. Thisis similar to previous studies [15,17]. Furthermore, we did not find a relationship between the number of teeth extracted and the chronic medical conditions investigated. This might be an underestimation due to the variability of medical conditionsamongthe participants. Some conditions were present only in low numbers, leaving the data without the statistical power to identify a difference. More research, focusing mainly on number of teeth extracted and chronic medical conditions, is needed to verify our findings.

We found that age is associated significantly with number of teeth extracted. However, this relationshipis weak, with an R squared value of0.007, which means that only 0.7% of the quantity of teeth extracted can be explained by the age factor. This highlights age as a mild risk factor for losing teeth among the participants, and older people should have more educational programs on taking care of their teeth.

In the ANOVA test, only the number of teeth extracted due to caries was found to be significantly lower than the number of teeth extracteddue to prosthodontictreatment. This might be because some dentists tend to remove teeth with an acceptable grade of mobility to fabricate a denture for the patient. However, our results cannot confirm that, since it was not a primaryquestion in our paper.

This study is considered the firstto investigate the reasons for teeth extraction in Madinah city, Saudi Arabia. Furthermore, this researchcovered the patients' records in all specialized dental centres in the governmental hospitals in Madinah city. This workhighlighted the chronic medical conditionsamong patients, to be used as an important point and as a baseline measurement for other studies. Nevertheless, this study used data from aone-year period only; more data could accentuate the accuracy of our data and give further insight into the trends of teeth extraction in our region. Also, primary health care centres were not included for data retrieval, so this should be covered in future researches. We recommend that future studies avoid such limitations and conduct surveillance to monitor and assess patients' statuses, to be linked with the national health care of the kingdom.

V. Conclusion

Dental caries was the most common reason for the extraction of permanent teethequally in males and femalesin Madinah city, Saudi Arabia. Furthermore, age was only a mild risk factor in affecting number of teeth extracted among study participants. Also, we couldn't find any connection between the chronic medical conditions investigated in this study and reasons for or number of extracted permanent teeth.

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