Original Article

Pattern and Causes of Extractions of Permanent Teeth in Tertiary Care Hospitals in Karachi, Pakistan

Parma Kumari[1], Sofia Ali Syed[2], Saira Atif[3], Kashif Aslam[4], Faryal Ali Syed[5] and Tauqeer Bibi[6]

ABSTRACT

Objective: To investigate the causes of dental extractions of permanent teeth in flood victims receiving treatment in tertiary care hospitals.

Study Design: Descriptive observational study.

Place and Duration of Study: This study was conducted at the Two Tertiary Dental Hospitals of Karachi from mid-January to mid-March 2023.

Materials and Methods: The current study investigated the causes of dental extractions of permanent teeth in 211 patients. Participants of this study were 10 to 70 years old. A specific survey form was used to collect information from the patients. SPSS version 27 was used for statistical analyses.

Results: The highest number of extracted teeth was reported in 21-30 years old females. Dental caries (49.3%) was the leading cause of extraction followed by periodontal problems (22.3%). The most common teeth that required extractions were mandibular third molars (19.4%) followed by mandibular first molars (16.4%).

Conclusion: Dental caries was reported to be the most prevalent cause of extractions of permanent teeth in flood-affected individuals.

Key Words: Tooth extraction, Dental caries, Periodontal disease, Oral health

Citation of article: Kumari P, Syed SA, Atif S, Aslam K, Syed FA, Bibi T. Pattern and Causes of Extractions of Permanent Teeth in Tertiary Care Hospitals in Karachi, Pakistan. Med Forum 2023;34(6):54-58.

INTRODUCTION

Currently, Pakistan is one of the countries in the world most frequently hit by floods. To design a successful healthcare program, it is essential to understand the typical health issues that flood victims deal with.

[1.] Department of Oral Pathology, Sir Syed College of Medical Sciences for Girls, Karachi.
[1.] Department of Oral Pathology, Dr. Ishrat-ul-Ibad Khan Institute of Oral Health Sciences, Dow University of Health Sciences, Karachi.
[3.] Department of Oral Biology, CMH Lahore Medical College & Institute of Dentistry, National University of Medical Sciences, Lahore.
[4.] Department of Prosthodontics, Dow Dental College, Dow University of Health Sciences, Karachi.
[5.] Department of Orthodontics, Baqai Dental College, Baqai Medical University, Karachi.
[6.] Department of Periodontology, Bahria University of Health Sciences, Karachi.

Correspondence: Sofia Ali Syed, Department of Oral Pathology, Dr. Ishrat-ul-Ibad Khan Institute of Oral Health Sciences, Dow University of Health Sciences, Karachi.
Contact No: 0332-3228520
Email: sofia.ali@duhs.edu.pk

Received: April, 2023
Accepted: May, 2023
Printed: June, 2023

The catastrophic monsoon rains and subsequent floods in Pakistan last year, have affected 33 million people, with many of them being displaced. Planning healthcare for flood victims demands for preventative and rehabilitative oral health services in addition to curative and medical therapies[1].

Permanent tooth erupts in the oral cavity from 6 to 14 years, excluding the third molars[2, 3]. The teeth perform several important functions during the life span of a person including mastication, phonetics, proprioception, and aesthetics. Teeth also have an impact on a person's self-confidence. Hence, it is importance to conserve permanent dentition; if lost they can only be replaced by artificial means[4]. There are many reasons for premature loss of a tooth which include dental caries, periodontitis, dental pulp infections, treatment failure, orthodontic reasons, impaction, pericoronitis, local pathology, prosthodontics, or trauma[2, 5, 6]. Most of the studies have reported caries as the primary cause of tooth extraction. Other non-clinical reasons of tooth extraction could be lack of awareness, limited access to dental care, low socioeconomic status, and ineffective oral hygiene habits[5-7]. Tooth loss leads to functional and aesthetics issues which ultimately have a grave psychological and social impact and undermines the self-confidence of the person[5, 8]. Extraction or loss of tooth without a suitable functional substitution also affects oral health-related quality of life[9].

Tooth extraction is a common dental procedure and has been practiced for decades by dentists all over the world. In developed countries, including the United Kingdom, the number of dental extractions is decreasing[10, 11]. However, in developing countries, like Pakistan, tooth extraction is favored over other more costly dental procedures due to shortage of oral healthcare facilities, shortage of trained staff, and low socioeconomic status[7, 10, 12]. Because of the fair number of extractions in Pakistan it is necessary to find the cause for tooth loss due to extractions[4, 7].

The purpose of this study was to examine the causes and trends of extractions of permanent teeth so that we can choose the best preventive measures for the general population. This study gave an overview of the oral healthcare status of in-hospital populations in public and private tertiary care hospitals dealing with displaced flood victims.

MATERIALS AND METHODS

A descriptive observational study was carried out with consecutive sampling of patients who needed extraction visiting dental out-patient departments of two tertiary dental hospitals of Karachi from mid-January to mid-March 2023. A sample size of 211 achieved 99% power to detect an effect size of 0.8143 using 48 degrees of freedom with a significance level alpha of 0.01. Ethical approval was obtained prior to start of study (FRC-BUHS 25/2022). Data was collected through a designed survey form after an informed written consent was obtained from all participants or their guardians. The tooth to be extracted was recorded along with reason of its extraction. SPSS version 27 was used for statistical analyses. The descriptive results were presented using frequency and percentages. Chi-squared or Fisher's exact tests were used to see association between tooth type extracted and reason of extraction with sex, and between age group and reason for tooth extraction with tooth type extracted. P-value < 0.05 was considered statistically significant.

RESULTS

The study sample comprised a total of 211 participants: 108 (51.2%) females and 103 (48.8%) males. Out of the total participants, majority of the participants (n=52, 24.6%) who underwent extractions were 21-30 years old, followed by those who were 41-50 years old (n=44, 20.8%). Among the 21-30 years old patients, most of the extractions were done for female patients (n=30, 27.7%) compared to male participants (n=22, 21.3%). Among patients who were 41-50 years old, male participants had most of the extractions done (n=24, 23.3%) compared to females (n=20, 18.5%), as shown in Table 1.

Table No. 1: Frequency of tooth extractions in males and females in different age groups

Age group (years)	Extracted teeth in male n (%)	Extracted teeth in female n (%)	Total extractions n (%)
10-20	8 (7.7%)	9(8.3%)	17(8%)
21-30	22(21.3%)	30(27.7%)	52(24.6%)
31-40	16(15.5%)	17(15.7%)	33(15.6%)
41-50	24(23.3%)	20(18.5%)	44(20.8%)
51-60	15(14.5%)	18(16.6%)	33(15.6%)
61-70	13(12.6%)	9(8.3%)	22(10.4%)
>70	5(4.9%)	5(4.6%)	10(4.7%)

According to extracted tooth type, the most extracted tooth was 3rd molar in both maxillary and mandibular arch. Least commonly extracted tooth was central incisor in maxillary arch and lateral incisor in mandibular arch, as shown in Figure 1 and 2.

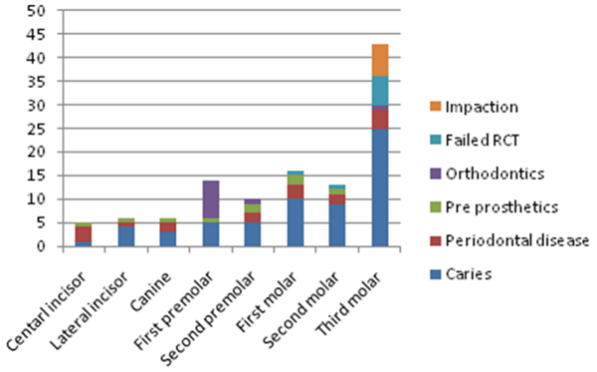

Figure 1: Cause of extraction of a particular tooth in maxillary arch.

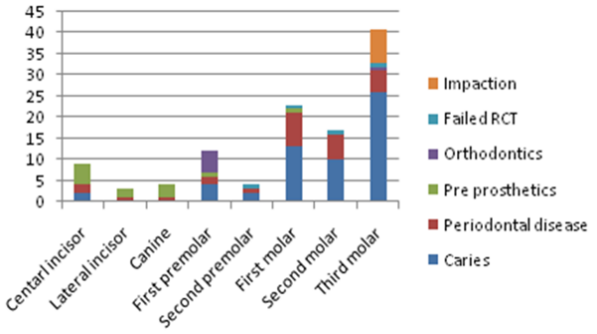

Figure 2: Cause of extraction of a particular tooth in mandibular arch.

Majority of the extractions performed were due to dental caries (n=104, 49.3%). Higher number of extractions due to dental caries were reported in females (n=63, 58.3%) compared to males (n=41, 39.8%). The second most reported reason of tooth extraction was due to periodontal problems (n=47, 22.3%) due to which higher number of extractions were reported in males (n=29, 28.1%) compared to females (n=18, 16.6%), as shown in Table 2. According to chi-squared test, there was no association between type of tooth extracted and sex, 9.44 (7), p=0.223. According to Fisher's exact test, there was no association between

cause of extraction in males and females, p=0.126. Comparisons of tooth type and reasons of extractions with sex are given in Table 2.

CI: central incisor; LI: lateral incisor; C: canine; 1P: 1st premolar; 2P: 2nd premolar; 1M: 1st molar; 2M: 2nd molar; 3M: 3rd molar; RCT: root canal treatment; M: male; F: female. Chi-squared or Fisher's exact test used; p<0.05 statistically significant.

Third molars were most frequently extracted in 21-30 years old, followed by patients who were 31-40 years old. According to Fisher's exact tests, there were significant association between extracted tooth type and age of the patients (p<0.001). Post-hoc Bonferroni test revealed that the association was significant between third molar extractions among 21-30 years old age group. Fisher's exact test also revealed a significant association between tooth type and reason of extraction (p<0.001). Post-hoc Bonferroni test applied to see significant group-wise comparisons as given in Table 3.

Table No.2: Comparison of tooth type extracted and reason of extraction with sex

Tooth type	Sex	Total n (%)	p-value	Reason of extraction	Sex	Total n (%)	p-value
CI	M=7 F=9	16 (7.6)	0.223	Dental caries	M=41 F=63	104 (49.3)	0.126
LI	M=3 F=6	9 (4.3)		Periodontal problems	M=29 F=18	47 (22.3)	
C	M=4 F=7	11 (5.2)		Impaction	M=10 F=11	21 (10)	
1P	M=9 F=15	24 (11.4)		Orthodontics	M=4 F=4	8 (3.8)	
2P	M=11 F=3	14 (6.6)		Pre-prosthetics	M=12 F=6	18 (8.5)	
1M	M=17 F=22	39 (18.5)		Failed RCT	M=5 F=5	10 (4.7)	
2M	M=19 F=14	33 (15.6)		Trauma	M=2 F=1	3 (1.4)	
3M	M=33 F=32	65 (30.8)					

Table No.3: Comparison of age group and reason for tooth extraction with tooth type extracted

	Age groups								Reason for tooth extraction							
Tooth type	10-20	21-30	31-40	41-50	51-60	61-70	>70	P-value	Dental caries	Periodontal problems	Impaction	Orthodontic reason	Pre-prosthetics	RCT failure	Trauma	p-value
CI	-	2 (0.9%)	1 (0.5%)	5 (2.4%)	5 (2.4%)	1 (0.5%)	2 (0.9%)	<0.001*&	1 (0.5%)	6 (2.8%)	6 (2.8%)	-	-	2 (0.9%)	1 (0.5%)	<0.001*§
LI	-	2 (0.9%)	-	3 (1.4%)	3 (1.4%)	-	1 (0.5%)		4 (1.9%)	2 (0.9%)	3 (1.4%)	-	-	-	-	
C	-	-	2 (0.9%)	1 (0.5%)	4 (1.9%)	2 (0.9%)	2 (0.9%)		3 (1.4%)	2 (0.9%)	5 (2.4%)	-	-	1 (0.5%)	-	
1P	3 (1.4%)	5 (2.4%)	3 (1.4%)	6 (2.8%)	3 (1.4%)	3 (1.4%)	1 (0.5%)		9 (4.3%)	5 (2.4%)	2 (0.9%)	7 (3.3%)	-	1 (0.5%)	-	
2P	-	2 (0.9%)	1 (0.5%)	4 (1.9%)	3 (1.4%)	2 (0.9%)	2 (0.9%)		6 (2.8%)	4 (1.9%)	2 (0.9%)	-	-	1 (0.5%)	1 (0.5%)	
1M	6 (2.8%)	8 (3.8%)	5 (2.4%)	7 (3.3%)	5 (2.4%)	7 (3.3%)	1 (0.5%)		24 (11.4)	9 (4.3%)	2 (0.9%)	-	-	3 (1.4%)	1 (0.5%)	
2M	4 (1.9%)	5 (2.4%)	7 (3.3%)	7 (3.3%)	4 (1.9%)	5 (2.4%)	1 (0.5%)		17 (8.1%)	12 (5.7%)	1 (0.5%)	-	1 (0.5%)	2 (0.9%)	-	
3M	4 (1.9%)	28 (13.3%)	14 (6.6%)	11 (5.2%)	6 (2.8%)	2 (0.9%)	-		40 (19%)	7 (3.3%)	-	1 (0.5%)	17 (8.1%)	-	-	

CI: central incisor; LI: lateral incisor; C: canine; 1P: 1st premolar; 2P: 2nd premolar; 1M: 1st molar; 2M: 2nd molar; 3M: 3rd molar; RCT: root canal treatment.

Fisher's exact test used; *p-value <0.05 statistically significant; &Association was significant between extracted third molars in 21-30 years old, p<0.001.

§Associations were significant between the following groups (p<0.001): central incisor–caries; central incisor–pre-prosthetics; canine–pre-prosthetics; first premolar–orthodontics; third molar–eruption problems.

DISCUSSION

Despite the various prevention initiatives that have been implemented, dental problems tend to be a significant public health burden worldwide. Tooth extraction is one of the most performed procedures at the dental office[12,13]. Poor oral health ultimately results in tooth decay or periodontal problems which if not treated early may result in tooth loss. Tooth extractions performed in a selected population gives us an idea about current attitudes towards oral health services and the facilities available[14]. It also gives information regarding oral hygiene practices which have a great impact on an individual's oral health. Understanding the causative and contributory factors of tooth loss is important for preparing and implementing successful strategies to minimize tooth extractions[7, 14].

Various studies have been conducted to identify the causes of permanent tooth loss in various populations. In the present study, the participants comprised of displaced persons due to recent flooding in interior Sindh province of Pakistan. Majority of these patients who underwent extraction of a tooth were in their third decade of life. Others have also reported higher number of tooth extractions in individuals in similar age group[5,15]. However, some authors have reported that tooth extractions are common in individuals who were in their fourth decade of life[10, 16]. The reasons of these conflicting results could be due to difference in study population and sample size.

In the present study, dental caries was the leading cause of extraction as 49.3% of the total number of extractions done was due to dental caries. Others have also reported dental caries as the primary reason for extractions[2,17-18]. The participants of this study belonged to low socioeconomic status; it is possible that their primary treatment of choice for a carious tooth was extraction rather than timely seeking conservative care due to issues with accessibility to dental care facility, affordability, lack of awareness, insufficient oral hygiene practices, and increased use of food rich in refined sugars.

In the present study, the second reason for tooth extraction reported was periodontal disease responsible for 22.3% of the extractions performed. It is the second common cause of extraction as reported by others[18]. However, others have reported periodontal disease as the main reason of tooth extractions [4, 15, 19] which could be because of difference in socioeconomic status and study population. A study conducted on Syrian refugees has reported that periodontitis was the third common cause accounting for only 3.4% of the study population. This could be because of better oral hygiene practices followed by Syrian refugees or difference in the age of the study population.

Third molar was the most frequently extracted tooth followed by first molar. However, the results of this study differ from majority of the studies where the first molar was the most commonly extracted tooth[5,11,12,15,18] which could be because of different study population and age of the participants. In this study, there was significant association between third molar extractions in 21-30 years old. There was also significant association between extraction of third molars and problems with eruption. Hence, the reason of difference from other studies could be because third molars are usually extracted due to impaction in these younger age groups once the eruption of tooth starts causing problems. It is also interested to note that there was a significant association between central incisor extraction and caries which may suggest poor oral hygiene practices by the study population. Incisors being the most important teeth in maintaining aesthetics and their loss severely compromise the confidence of the individual.

In this study, females were more frequently affected with dental caries and underwent extractions and 58% of total extractions were due to dental caries in females. However, the association was not significant between sex and cause of extraction or between sex and type of extracted tooth. The increased proportion of females undergoing extractions due to caries could be attributed to difference in chemical composition and variable antimicrobial capacity of saliva; hence, promoting caries formation[20]. It could also be because females in our society are dependent on their fathers or husbands to take them to dental care units; a delay in timely seeking restorative care could have resulted in extractions as the only viable. Such findings are consistent with other studies[2].

The strength of this study includes that the information was collected from public setup which catered to oral health needs of displaced persons due to floods which will help us in comparing the treatment approaches for similar presenting complaints at different centers. Results have identified future knowledge gap regarding etiology of extraction of permanent tooth in similar study populations. This also tells us the need of providing community dental health services along with medical care facilities for displaced persons. This has laid the foundation of framework for future oral health maintenance policies. It identified that our focus should be shifted towards mass awareness about personal oral hygiene and cost-effective dental treatment center need at the government level.

CONCLUSION

This study clearly shows that, in majority of the patients undergoing tooth extraction, molars were the most commonly extracted teeth. Caries is the major reason for extraction followed by periodontal diseases. The study depicts the need of implementation of preventive measures to reduce these common causes and pattern of permanent teeth loss.

Author's Contribution:

Concept & Design of Study:	Sofia Ali Syed, Parma Kumari
Drafting:	Parma Kumari, Faryal Ali Syed, Tauqeer Bibi
Data Analysis:	Parma Kumari, Faryal Ali Syed, Tauqeer Bibi, Kashif Aslam, Fatima Khaleeq
Revisiting Critically:	Sofia Ali Syed, Saira Atif
Final Approval of version:	All authors

Conflict of Interest: The study has no conflict of interest to declare by any author.

REFERENCES

1. Ochani S, Aaqil SI, Nazir A, Athar FB, Ochani K, Ullah K. Various health-related challenges amidst recent floods in Pakistan; strategies for future prevention and control. Annals Med Surg 2022; 82:104667.
2. Nuvvula S, Chava VK, Nuvvula S. Primary culprit for tooth loss! J Ind Soc Periodontol 2016;20(2):222-4.
3. Udoye CI, Jafarzadeh H, Kinoshita JI, Manabe A, Kobayashi M. Prevalence and Reasons for Extraction of Endodontically Treated Teeth in Adult Nigerians. J Contemp Dent Pract 2018;19 (12):1469-73.
4. Samuel SS, Selvaraj DSS, Ebenezer J, Rebekah G, Koshy S. Nature and pattern of primary teeth extractions in a tertiary care hospital setting in South India. Ind J Dent Res 2018;29(2):186-9.
5. Taiwo AO, Ibikunle AA, Braimah RO, Sulaiman OA, Gbotolorun OM. Tooth extraction: Pattern and etiology from extreme Northwestern Nigeria. Eur J Dent 2017;11(3):335-9.
6. Bani M, Akal N, Bodur H, Odabaş ME, Tüzüner T, Delilbaşı AE, et al. The reasons for extractions of primary teeth in Turkish children. Eur J Paediatr Dent 2015;16(3):187-90.
7. Eigbobo JO, Gbujie DC, Onyeaso CO. Causes and pattern of tooth extractions in children treated at the University of Port Harcourt Teaching Hospital. Odontostomatol Trop 2014;37(146):35-41.
8. Silva-Junior MF, Sousa ACC, Batista MJ, Sousa M. Oral health condition and reasons for tooth extraction among an adult population (20-64 years old). Cien Saude Colet 2017;22(8):2693-702.
9. Bansal M, Gupta N, Gupta P, Arora V, Thakar S. Reasons for extraction in primary teeth among 5-12 years school children in Haryana, India- A cross-sectional study. J Clin Exp Dent 2017;9(4): e545-e9.
10. Alesia K, Khalil HS. Reasons for and patterns relating to the extraction of permanent teeth in a subset of the Saudi population. Clin Cosmet Investig Dent 2013;5:51-6.
11. Censi R, De Micheli L, Borgonovo AE, Vavassori V, Re D. Treatment of seriously compromised teeth: decision- making criteria and treatment options. Minerva Stomatol 2013;62(9):321-33.
12. Medina-Solís CE, Pontigo-Loyola AP, Pérez-Campos E, Hernández-Cruz P, De la Rosa-Santillana R, Navarete-Hernández Jde J, et al. [Principal reasons for extraction of permanent tooth in a sample of Mexicans adults]. Rev Invest Clin 2013;65(2):141-9.
13. Saheeb BD, Sede MA. Reasons and pattern of tooth mortality in a Nigerian Urban teaching hospital. Ann Afr Med 2013;12(2):110-4.
14. Olley RC, Renton T, Frost PM. Observational study investigating tooth extraction and the shortened dental arch approach. J Oral Rehabil 2017;44(8):610-6.
15. Danielson OE, Chinedu AC, Oluyemisi EA, Bashiru BO, Ndubuisi OO. Frequency, causes and pattern of adult tooth extraction in a Nigerian rural health facility. Odontostomatol Trop 2011; 34(134):5-10.
16. Saghafi N, Heaton LJ, Bayirli B, Turpin DL, Khosravi R, Bollen AM. Influence of clinicians' experience and gender on extraction decision in orthodontics. Angle Orthod 2017;87(5):641-50.
17. Osunde OD, Efunkoya AA, Omeje KU. Reasons for loss of the permanent teeth in patients in Kano, North Western Nigeria J West Afr Coll Surg 2017;7(2):47-64.
18. Kashif M, Mehmood K, Ayub T, Aslam M. Reasons and patterns of tooth extraction in a tertiary care hospital-A cross sectional prospective survey. J Liaquat Uni Med Health Sci 2014;13(03):125-29.
19. Suzuki S, Sugihara N, Kamijo H, Morita M, Kawato T, Tsuneishi M, et al. Reasons for Tooth Extractions in Japan: The Second Nationwide Survey. Int Dent J 2022;72(3):366-72.
20. Martinez-Mier EA, Zandona AF. The impact of gender on caries prevalence and risk assessment. Dent Clin North Am 2013;57(2):301-15.