

Pattern and Clinical Reasons for Dental Extractions in Patients Visiting a Tertiary Health Care Centre in Southern District- Nuh of Haryana, India: A Retrospective Observational Study

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ABSTRACT

Introduction: The causes of tooth extraction exhibit significant geographical and cultural variations between regions within a country and across different countries. To date, no study has been conducted on the pattern of tooth loss in a comparatively socially and economically disadvantaged population in Nuh, Haryana, India.

Aim: To analyse the pattern and clinical reasons for tooth extraction in relation to factors such as age and gender among patients visiting the Dental Department of a tertiary care centre in India.

Materials and Methods: A retrospective observational study was carried out in the Department of Dentistry, Shaheed Hasan Khan Mewati (SHKM) Government Medical College Nalhar, Nuh, Haryana, India, from January 2017 to December 2019. Data were collected from the available records of patients across different age groups during the period from January 2017 to December 2019. Data on age, gender, reasons for extraction, jaw type and tooth number were recorded. The total number of extracted teeth was used for statistical analysis using Microsoft Excel software.

Results: During the study period, 2643 patients underwent tooth extraction, with 1304 (49.33%) being males and 1339 (50.66%) females. A total of 3358 teeth were extracted, with 1382 in males and 1976 in females. The number of teeth extracted was higher in females (58.84%, n=1976) compared to males (41.15%, n=1382). The majority of extractions occurred in the 21-30 years age group, 750 (21.73%) followed by the 31-40 years age group, 663 (19.71%). The most common reason for extraction was dental caries and its sequelae, 2462 (73.34%). The most frequently extracted tooth was the first molar in the fourth quadrant (9.26%) followed by the first molar in the third quadrant (8.72%).

Conclusion: Given the paramount importance of first permanent molars, it is concerning to see many young patients losing this tooth in the present study. Therefore, it is crucial to raise awareness among the general population about maintaining oral hygiene, regular dental check-ups and treatment. The role of pit and fissure sealants in caries prevention for first permanent molars cannot be overstated.

Keywords: Caries, Extraction, Periodontal, Trauma

INTRODUCTION

Tooth extraction is a skilled dental procedure carried out since long and is considered a crude but useful measure for assessing the dental status of a community [1]. The causes of tooth extraction vary significantly geographically and culturally between different regions within a country and from one country to another [1,2]. Many studies have been conducted to evaluate the patterns and reasons for the extraction of permanent teeth [3-6]. It has been observed that edentulism has decreased over the past few decades, but a considerable population of adults still experience tooth loss. Tooth loss can have various detrimental effects on an individual, such as impairment of masticatory function, unpleasant aesthetics, speech difficulties, temporomandibular dysfunctions, psychological issues and social withdrawal [5]. Indeed, it has become a matter of serious global concern over time [6].

Dental caries and periodontitis are commonly regarded as the leading causes of tooth loss [7,8], with caries being more prevalent than periodontitis [9]. Studies have shown that the most commonly extracted teeth are the first permanent mandibular molars, followed by maxillary first molars mandibular second molars, and maxillary second premolars [10]. However, Tzimpoulas NE et al., have suggested that maxillary molars are actually the most commonly extracted teeth [11]. This discrepancy highlights the controversy

surrounding the pattern of tooth loss in any given population. Previous studies have also indicated that individuals of higher social class exhibit a lower prevalence of tooth loss [12]. Data from several countries indicate that edentulism is more prevalent among lower socio-economic groups [12]. The lower socio-economic elderly population in India has been found to place little or no emphasis on preserving their teeth throughout their lifetime, often opting for extraction over restoration [13].

The Nuh district of Haryana is known to be one of the most underdeveloped districts in India, with a majority of its population being poor farmers [14]. Due to its poor health indicators and infrastructure, this area has always been a cause for rising concern [15]. It has been observed that patients only seek dental treatment when the dental disease is in an advanced stage and the affected tooth/teeth are beyond salvage. Routine dental care is not a common practice here. Therefore, it is expected that the clinical reasons and patterns of tooth extraction may differ from those observed in other parts of Haryana or India.

To date, no study on the pattern of tooth loss has been conducted in this area. It would be interesting to assess the reasons and patterns of tooth extraction in a socially and economically disadvantaged population of Nuh. The present observational study was aimed to retrospectively analyse the patterns and clinical reasons for tooth mortality in relation to various factors, including age and gender, in

patients presenting to the Department of Dentistry at SHKM GMCH, Nalhar, Nuh, Haryana, India.

MATERIALS AND METHODS

A retrospective observational study was conducted in the Department of Dentistry, SHKM Government Medical College, Nuh, the southern region of Haryana, India, from January 2017 to December 2019. Data were collected from the available records of patients across different age groups during the study period. The data collection was done from March 2022 to May 2022 and data analysis was done from June 2022 to November 2022. Ethical clearance was obtained from the Institutional Ethics Committee (IEC) (reference number: EC-OA-06/2022). Since this is a time-bound study, only records within the study duration were included in the analysis.

Inclusion criteria: The Outpatient Department (OPD) patients who had undergone extraction of any permanent tooth deemed non salvageable and patients who reported between January 2017 and December 2019 were included in the study.

Exclusion criteria: Deciduous teeth, supernumerary teeth, and patients aged less than six years were excluded from the study. Any incomplete record data was excluded.

Study Procedure

Data on age, gender, reasons for extraction, jaw type, and tooth number were collected from the available records. If a patient underwent extraction of more than one tooth, each extraction was considered as an additional entry. According to the selection criteria of the present study, 2643 patients underwent tooth extraction procedures between January 2017 and December 2019.

STATISTICAL ANALYSIS

The total number of extracted teeth was used for statistical analysis using Microsoft Excel software. The data was collected and plotted on the Excel sheet and expressed as descriptive data.

RESULTS

Out of 2643 patients included in the study, 1304 (49.33%) were males and 1339 (50.66%) were females. As some of the patients underwent more than one extraction, the total number of teeth extracted was 3358, with 1382 extracted from males and 1976 from females. The average extraction per patient was 0.4 (1.27%). The number of teeth extracted was higher in females (1976, 58.84%) than in males (1382, 41.15%). The male-to-female ratio of extraction is 1:1.42. The distribution of extracted teeth in males and females is shown in [Table/Fig-1]. The most common tooth extracted was the 1st molar in the 4th quadrant, 311 (9.26%), followed by the 1st molar in the 3rd quadrant, 293 (8.72%). The majority of teeth extracted were in the 21-30 years age group, 750 (21.73%), followed by the 31-40 years age group, 663 (19.71%).

Age-wise distribution of extracted teeth in males and females is shown in [Table/Fig-2]. The most common reason for dental extraction was dental caries and its sequelae, 2462 (73.34%), followed by periodontal problems, 654 (19.48%). The least common cause of extraction was endodontic failure, 10 (0.29%).

The cause-wise distribution of extractions in males and females is shown in [Table/Fig-3]. The cause-wise distribution of dental extraction for each tooth is shown in [Table/Fig-4]. The cause of extraction of teeth in different age groups is shown in [Table/Fig-5]. The number of teeth extracted from the lower jaw, 2030 (60.45%)

Tooth number	Name of tooth	Females (n)	F %	Males (n)	M %	Total M+F (n)	M+F %
Quadrant 1: Right maxillary							
11	Central incisor	27	1.37	26	1.88	53	1.58
12	Lateral incisor	26	1.32	23	1.66	49	1.46
13	Canine	25	1.27	20	1.45	45	1.34
14	First premolar	40	2.02	28	2.03	68	2.03
15	Second premolar	43	2.18	22	1.59	65	1.94
16	First molar	81	4.10	57	4.12	138	4.11
17	Second molar	52	2.63	61	4.41	113	3.37
18	Third molar	77	3.90	52	3.76	129	3.84
Total		371	18.78	289	20.91	660	19.65
Quadrant 2: Left maxillary							
21	Central incisor	26	1.32	27	1.95	53	1.58
22	Lateral incisor	26	1.32	18	1.30	44	1.31
23	Canine	30	1.52	24	1.74	54	1.61
24	First premolar	40	2.02	25	1.81	65	1.94
25	Second premolar	37	1.87	29	2.10	66	1.97
26	First molar	75	3.80	56	4.05	131	3.90
27	Second molar	72	3.64	56	4.05	128	3.81
28	Third molar	67	3.39	60	4.34	127	3.78
Total		373	18.88	295	21.35	668	19.89
Quadrant 3: Left mandibular							
31	Central incisor	21	1.06	21	1.52	42	1.25
32	Lateral incisor	17	0.86	14	1.01	31	0.92
33	Canine	21	1.06	19	1.37	40	1.19
34	First premolar	31	1.57	13	0.94	44	1.31
35	Second premolar	61	3.09	38	2.75	99	2.95
36	First molar	187	9.46	106	7.67	293	8.73
37	Second molar	119	6.02	76	5.50	195	5.81
38	Third molar	157	7.95	120	8.68	277	8.25
Total		614	31.07	407	29.45	1021	30.41

Quadrant 4: Right mandibular							
41	Central incisor	19	0.96	15	1.09	34	1.01
42	Lateral incisor	21	1.06	10	0.72	31	0.92
43	Canine	28	1.42	10	0.72	38	1.13
44	First premolar	33	1.67	15	1.09	48	1.43
45	Second premolar	64	3.24	33	2.39	97	2.89
46	First molar	183	9.26	128	9.26	311	9.26
47	Second molar	132	6.68	78	5.64	210	6.25
48	Third molar	138	6.98	102	7.38	240	7.15
Total		618	31.28	391	28.29	1009	30.05
Total of all quadrants		1976		1382		3358	

[Table/Fig-1]: Tooth-wise distribution of extracted teeth in females, males and total.

Age group	Females		Males		Total	
	n	% of total	n	% of total	n	% of total
<10 years	4	0.20	4	0.29	8	0.24
11-20 years	175	8.87	116	8.39	291	8.67
21-30 years	480	24.32	270	19.52	750	22.34
31-40 years	424	21.48	239	17.28	663	19.75
41-50 years	382	19.35	249	18.00	631	18.80
51-60 years	314	15.91	224	16.20	538	16.03
61-70 years	177	8.97	231	16.70	408	12.15
71-80 years	15	0.76	43	3.11	58	1.73
>80 years	5	0.25	6	0.43	11	0.33
Total	1976		1382		3358	

[Table/Fig-2]: Distribution of extracted teeth by age and gender.

Reason of tooth extraction	Females		Males		Total	
	n	% of total	n	% of total	n	% of total
Caries and its sequel	1521	76.97	941	68.04	2462	73.34
Periodontal problems	329	16.67	325	23.50	654	19.48
Impacted tooth	97	4.91	84	6.07	181	5.39
Trauma	8	0.41	22	1.59	30	0.89
Prosthetic reasons	16	0.81	5	0.36	21	0.63
Endodontic failure	5	0.25	5	0.36	10	0.30
Total	1976		1382		3358	

[Table/Fig-3]: Cause-wise distribution of extractions in males and females.

Cause	Caries		Periodontal		Endodontic		Impacted		Prosthetic		Trauma	
	n	%	n	%	n	%	n	%	n	%	n	%
Quadrant 1												
Central incisor	20	0.81	23	3.52	0	0	0	0	1	4.76	9	30.00
Lateral incisor	28	1.14	17	2.60	0	0	0	0	1	4.76	3	10.00
Canine	26	1.06	18	2.75	0	0	0	0	0	0.00	1	3.33
First premolar	47	1.91	19	2.91	1	10	0	0	1	4.76	0	0.00
Second premolar	47	1.91	17	2.60	1	10	0	0	0	0.00	0	0.00
First molar	119	4.83	18	2.75	0	0	0	0	1	4.76	0	0.00
Second molar	91	3.70	22	3.36	0	0	0	0	0	0.00	0	0.00
Third molar	96	3.90	22	3.36	0	0	11	6.08	0	0.00	0	0.00
Total	474	19.26	156	23.85	2	20	11	6.08	4	19.0	13	43.33
Quadrant 2												
Central incisor	21	0.85	26	3.98	0	0	0	0	0	0.00	6	20.00
Lateral incisor	22	0.89	21	3.21	0	0	0	0	0	0.00	1	3.33
Canine	29	1.18	22	3.36	0	0	1	0.55	0	0.00	2	6.67
First premolar	47	1.91	18	2.75	0	0	0	0	0	0.00	0	0.00
Second premolar	49	1.99	17	2.60	0	0	0	0	0	0.00	0	0.00
First molar	117	4.75	12	1.83	1	10	0	0	1	4.76	0	0.00

outnumbered those extracted from the upper jaw, 1328 (39.54%). The mandibular posterior teeth, 1814 (54.02%) were the most extracted, followed by the maxillary posterior teeth, 1030 (30.67%).

DISCUSSION

The extraction of teeth is the most common surgical procedure performed by dental practitioners. From a historical perspective, dental extractions have been frequently used to treat a variety of conditions even before the advent of antibiotics. It is crucial for dental service providers to understand the patterns and clinical reasons for dental extractions in their patients in order to provide effective preventive and corrective measures in their localities, regions, or countries.

Although demographic and socio-economic data related to the patterns and reasons for tooth extraction in patients visiting dental OPDs worldwide have been extensively studied in the past, very few studies have been conducted in India, and none in the most backward district and Mewat region of India. Therefore, the present study was designed.

In the present study, the number of teeth extracted was higher in females, 1976 (58.84%) compared to males, 1382 (41.15%) out of a total of 3358 teeth extracted. Female preponderance was also seen in studies conducted in Tamil Nadu, India, with females accounting for 57.94% and males for 42.06% [16]. Similar trends were observed in Eastern Nigeria, where females made up 62.3% and males 37.7% [17]. In Iraq, the numbers were 53.3% for females and 46.7% for males [18]. Canada showed a breakdown of 53.5% females and 46.5% males [19]. In Pakistan, females represented

Second molar	110	4.47	16	2.45	2	20	0	0	0	0.00	0	0.00
Third molar	97	3.94	17	2.60	0	0	13	7.18	0	0.00	0	0.00
Total	492	19.98	149	22.78	3	30	14	7.73	1	4.76	9	30
Quadrant 3												
Central incisor	6	0.24	33	5.05	0	0	0	0	1	4.76	2	6.67
Lateral incisor	8	0.32	21	3.21	0	0	0	0	0	0.00	2	6.67
Canine	15	0.61	22	3.36	0	0	0	0	1	4.76	2	6.67
First premolar	29	1.18	12	1.83	0	0	0	0	2	9.52	1	3.33
Second premolar	82	3.33	15	2.29	0	0	0	0	2	9.52	0	0.00
First molar	262	10.64	28	4.28	2	20	0	0	1	4.76	0	0.00
Second molar	162	6.58	28	4.28	3	30	2	1.10	0	0.00	0	0.00
Third molar	165	6.70	26	3.98	0	0	84	46.41	2	9.52	0	0.00
Total	729	29.6	185	28.28	5	50	86	47.51	9	42.8	7	23.34
Quadrant 4												
Central incisor	7	0.28	26	3.98	0	0	0	0	1	4.76	0	0.00
Lateral incisor	9	0.37	21	3.21	0	0	0	0	1	4.76	0	0.00
Canine	19	0.77	16	2.45	0	0	1	0.55	1	4.76	1	3.33
First premolar	29	1.18	17	2.60	0	0	0	0	2	9.52	0	0.00
Second premolar	75	3.05	21	3.21	0	0	0	0	1	4.76	0	0.00
First molar	288	11.70	23	3.52	0	0	0	0	0	0.00	0	0.00
Second molar	192	7.80	18	2.75	0	0	0	0	0	0.00	0	0.00
Third molar	148	6.01	22	3.36	0	0	69	38.12	1	4.76	0	0.00
Total	767	31.16	164	25.08	0	0	70	38.67	7	33.3	1	3.33
Grand total	2462		654		10		181		21		30	

[Table/Fig-4]: Cause-wise distribution of dental extraction of each tooth.

Age group	Caries		Periodontic		Impacted		Trauma		Prosthodontic		Endodontic	
	n	% of total	n	% of total	n	% of total	n	% of total	n	% of total	n	% of total
<10 years	6	0.24	0	0.00	0	0.00	2	6.67	0	0.00	0	0
11-20 years	262	10.64	1	0.15	12	6.67	14	46.67	0	0.00	2	20
21-30 years	607	24.65	11	1.68	115	63.89	12	40.00	0	0.00	4	40
31-40 years	565	22.95	51	7.80	46	25.56	0	0.00	0	0.00	1	10
41-50 years	459	18.64	167	25.54	4	2.22	0	0.00	0	0.00	1	10
51-60 years	322	13.08	201	30.73	1	0.56	0	0.00	12	57.14	2	20
61-70 years	209	8.49	187	28.59	2	1.11	2	6.67	8	38.10	0	0
71-80 years	27	1.10	30	4.59	0	0.00	0	0.00	1	4.76	0	0
>80 years	5	0.20	6	0.92	0	0.00	0	0.00	0	0.00	0	0
Total	2462		654		180		30		21		10	

[Table/Fig-5]: Cause of extraction of teeth in different age groups.

56.75%, while males were at 43.25% [20]. Female preponderance may be attributed to factors such as access to oral health care facilities, reliance on other family members for healthcare visits and limited time for self-care.

In the present study, the most common tooth extracted was the 1st molar in the 4th quadrant (9.26%), followed by the 1st molar in the 3rd quadrant (8.72%). These results were similar to other studies conducted in Nigeria and Pakistan (32.83%) [8,20]. Meanwhile, the most commonly extracted tooth was the first maxillary premolar (9.4%), followed by the mandibular second premolar (6.8%) in a study conducted in Iraq [18]. The mandibular left third molar (11.7%) was the most common tooth extracted in a study from Northwest Nigeria [21].

The least common teeth extracted were the lateral incisors of the 3rd and 4th quadrants (0.92%) and the central incisor of the 4th quadrant (1.01%). The present results were in concordance with a study conducted in the Saudi population (0.7%) [6] and in Pakistan (4.91%) [6,20]. A study in Iraq observed that the least common extracted teeth were the central incisors of the upper arch (4.4%) and lower arch (4.3%), respectively [18]. The lowest

extracted teeth were canines in studies conducted in Nigeria (1.5%) and Northwest Nigeria (11.7%) [8,21].

The mandibular posterior teeth (54.02%) were the most extracted, followed by the maxillary posterior teeth (30.67%). These results were similar to other studies conducted in Tamil Nadu, India, where the mandibular posterior teeth (32.3%) were followed by the maxillary posterior teeth (26%) [16], and in Nigeria, where the mandibular (60.2%) and maxillary (39.8%) posterior teeth were extracted [8].

The number of teeth extracted from the lower jaw, 2030 (60.45%) outnumbered those extracted from the upper jaw, 1328 (39.54%).

In the present study, the majority of teeth extracted were in the 21-30 years age group (21.73%), followed by the 31-40 years age group (19.71%). It is quite alarming that the majority of extractions were in the younger age group. In both male and female genders, there were more teeth extractions in the 21-30 years age group than in all the other age groups. Similar results were observed in studies conducted in Northwest Nigeria (35.7% in the 21-30 years age group) [21], Eastern Nigeria (age group 11-30 years) [17], and Saudi Arabia (29% in the 21-30 years age group) [6]. The reason for maximal tooth loss at a younger age group could be poor oral

hygiene, improper brushing techniques, bad eating habits like consumption of sweets and candies, lack of preventive measures like sealants, and lack of dental visits and follow-ups in this region [14].

In the present study, the most common reason for tooth extraction was dental caries and its sequel (73.34%), followed by periodontal problems (19.48%). This held true for both male and female genders. The least common cause of extraction was endodontic failure (0.29%). Caries was the most common cause of tooth extraction, followed by periodontal reasons, in most studies conducted in Tamil Nadu (43.0% and 39.4%) [16], Eastern Nigeria (55.2% and 23.1%) [17], Saudi Arabia (50.2% and 8.2%) [6], Pakistan (51.8% and 19.2%) [20], Northwest Nigeria (54.1% and 16.5%) [21] and Japan (43.4% and 41.8%) [22], except for a study conducted in Canada, which showed periodontal problems as the most common cause (35.9%) of tooth extraction followed by caries and its sequels (28.9%) [19]. Caries is the most common cause of tooth extraction in most studies, and the reason could be the change in dietary habits from fibrous and complex sugars to more refined sugars, aerated drinks, sweets, etc., along with a lack of preventive measures due to a lack of awareness and poor socio-economic reasons in this region. Dental caries was the primary cause for the extraction of posterior teeth, 2253/2844 (79.21%), while periodontal problems were the primary cause for the extraction of anterior teeth, 266/514 (51.75%).

The mandibular right first molar, 288/2463 (11.69%) was the most commonly extracted tooth due to caries, followed by the mandibular left first molar (10.63%). The tooth least commonly extracted due to caries was the mandibular left central incisor, 6/2463 (0.24%), followed by the mandibular right central incisor, 7/2463 (0.28%). The role of flushing of food debris and composition of saliva by the location of salivary gland openings could also be the reason for more or less tooth decay.

The mandibular left first and second molars were the most commonly extracted teeth due to periodontal problems, 28/654 (4.28%). The maxillary left first molar and mandibular left first premolar were the teeth least commonly extracted due to periodontal problems, 12/654 (1.83%). It was found that tooth extraction due to a periodontal cause was evenly distributed throughout the oral cavity, i.e., maxillary anterior (19.42%), mandibular anterior (21.26%), maxillary posteriors (27.21%), and mandibular posteriors (32.1%). This signifies that periodontal problems affect the whole dentition rather than a particular tooth.

On comparing the age group with the cause of extraction, caries was maximum in the age group of 21-40 years (47.60%), possibly because the rural population is generally inclined to have their symptomatic teeth extracted rather than conserving them due to a lack of awareness and socio-economic reasons. The periodontal cause was maximum in the age group of 51-70 years (59.32%). With aging, periodontal problems are accumulative in nature due to long-term poor oral hygiene maintenance, bone resorption, tooth wear, duration of smoking, and other co-morbidities in the older age group.

Among impacted teeth, the mandibular left third molar was the most commonly impacted tooth (46.11%). This may be due to recurrent pericoronitis in the region caused by poor oral hygiene maintenance and awareness. Additionally, the attitude of dental service providers leans more towards extraction rather than conservative methods for wisdom teeth.

Among teeth that were extracted due to trauma, 96.66% were anterior teeth. The maxillary right central incisor was the most commonly extracted tooth due to trauma (30%), followed by the maxillary left central incisor (20%). This might be due to the anatomical position of these teeth and anteriors being more vulnerable than the posteriors. Also, the maximum tooth loss due to trauma was in the age group of 11-30 years (86.67%). This may be

attributed to the young population being immature and involved in road traffic accidents and physical assaults.

From a functional and developmental point of view, the first permanent molars are the most important teeth with a key role in occlusion. The loss of first permanent molars due to dental caries negatively affects both arches and has adverse effects on occlusion. They are the first permanent teeth to erupt in the oral cavity, and their occlusal surfaces have several pits and fissures that make them susceptible to dental caries. Therefore, it is important to create awareness among the general population regarding the maintenance of oral hygiene, regular dental check-ups and treatment. The role of pit and fissure sealants in the prevention of caries if the first permanent molars cannot be overemphasised [23].

Limitation(s)

Data from January 2020 until the commencement of the study in June 2022 was not available due to the hospital being declared a Coronavirus Disease 2019 (COVID-19) Hospital.

CONCLUSION(S)

The loss of first permanent molars, especially in the younger age group of 21-30 years, is alarming as it can impact both arches due to malocclusion. Additionally, caries is identified as the leading cause of tooth decay in the present study. There is a crucial need for oral hygiene awareness among the people. Large-scale oral health maintenance camps should be conducted in this area to raise awareness about common oral health issues, especially tooth decay and gingival problems. It is also essential to educate the local population about preventive measures such as pit and fissure sealants, regular dental check-ups and treatment.

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