Reasons for Extraction of Permanent Teeth in Western India: A Prospective Study

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Research Article

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ABSTRACT

Aims and objectives: Loss of teeth may have deleterious effects on physical as well as psychological well-being of an individual. The present study is aimed at analysing the various reasons for extractions of permanent teeth in patients attending dental department of a medical institute in western part of India.

Materials and methods: Patients in the age group of 15 to 84 years and undergoing extraction of permanent teeth in outpatient dental section of GMERS Medical College, Valsad, Gujarat between June and December of 2017 were included in the study. The cause for extractions was categorized as follows: (1) Dental caries; (2) periodontal disease; (3) trauma; (4) Prosthetic reason; (5) Orthodontic treatment; (6) Failed endodontic treatment; and (7) impaction. The patients were divided into 7 age groups (15-24; 25-34; 35-44; 45-54; 55-64; 65-74; 75-84 years).

Results: A total of 869 teeth were extracted in 615 patients. 50.51% teeth were extracted due to dental caries and 38.43% teeth due to periodontal disease. Trauma and prosthetic reason accounted for 2.19% and 5.52% of teeth lost, respectively. Pericoronitis was the cause for extraction of 3.11% teeth. Nearly half of teeth (53.7%) were extracted due to dental caries in the patients less than 45 years of age (15-44 years group). Periodontal disease accounted for 81.4% of extractions in patients who were 45 years or older (45-84 years group). First molars were the most commonly extracted teeth (19.4%) followed by third molars (16%).

Conclusion: Dental caries and its sequelae is the main reason for the extractions of permanent teeth followed by periodontal disease. As the age increases, periodontal disease becomes more important reason for tooth loss.

INTRODUCTION

Tooth loss remains to be a major oral health problem in a population worldwide. Extractions of permanent teeth is performed for several reasons such as dental caries, periodontal diseases, traumatic injuries, prosthetic considerations, orthodontic treatment, failed endodontic treatment and tooth impaction. However, dental caries and periodontal disease are two major causes of tooth loss worldwide [1]. Tooth loss is often associated with poor oral health which in turn can affect the overall health of an individual [2]. Negative impact of tooth loss on oral health-related quality of life has been well documented [3]. Therefore, as oral health care providers, our primary aim should be to prevent tooth loss. Understanding and detailed knowledge of the various reasons leading to tooth loss may be helpful to achieve this aim.

A number of epidemiological surveys have been carried out by various researchers in several countries across the world [4-15]. Majority of these studies have suggested that dental caries is the major reason for extraction of permanent teeth in younger age group but as the age increases periodontal disease becomes more important reason for tooth loss. It is also evident that tooth extraction because of dental caries is significantly higher in irregular dental attenders than regular attenders [7]. Various studies conducted in different parts of India have also reported that dental caries and periodontal diseases account for majority of tooth

loss [16-20]. These studies suggested that tooth loss due to dental caries ranges from 19.8% to 55.67% whereas periodontal disease account for 23.59% to 77% of tooth loss.

At present, limited data is available on causes of tooth loss in India, particularly Gujarat state. Availability of these data can be utilized for planning preventive oral health care policies in a given population. These data may also help in understanding nature of oral diseases and changing disease patterns at the population level. Hence, aim of the present study was to investigate the causes and pattern of loss of permanent teeth among patients attending a medical teaching hospital in western India.

MATERIALS AND METHODS

This was a single-center, observational study. Patients who reported to outpatient section of department of dentistry, GMERS Medical College and Hospital, Valsad, Gujarat, India between June 2017 and December 2017 were included in this study. Age, gender, tooth extracted and reasons for extraction for all the patients were noted.

Reasons for extraction were divided into following categories:

(a) **Dental caries:** Teeth with dental caries and its sequelae including acute/chronic pulpitis, apical periodontitis, periapical abscess, root remnants.

(b) **Periodontal disease:** Teeth with deep periodontal pockets, mobility, recurrent periodontal abscess and pain indicative of periodontal disease.

(c) **Trauma:** Teeth with fracture crown and/or root due to direct or indirect blow which were asymptomatic prior to history of trauma.

(d) **Prosthetic:** Teeth which were extracted because their removal facilitated better prosthetic restoration.

(e) **Orthodontic treatment:** Teeth which were extracted to create space for alignment of teeth and were advised by specialists practicing orthodontics.

(f) **Failed endodontic treatment:** Teeth which had undergone complete endodontic treatment in the past but developed symptoms warranting their removal.

(g) **Impaction:** Removal of partially or fully impacted teeth.

Inclusion criteria

Patients between the age of 15 and 84 years

Patients undergoing extraction of permanent teeth

Exclusion criteria

- Patients undergoing extraction of deciduous and supernumerary teeth

- Teeth where exact reason for extraction could not be ascertained (for example, a grossly carious and impacted third molar with pericoronitis)

Statistical Analysis

The data obtained were analysed using Microsoft Excel.

RESULTS

Between June 2017 and December 2017, 615 patients underwent extraction of teeth out of which 305 (49.6%) were males and 310 (50.4%) were females. Age of the patients ranged from 15 to 84 years **(Table 1)**. Those who were younger or older than this age group were not included. The patients were categorized into 7 age groups: 15-24 years; 25-34 years; 35-44 years; 45-54 years; 55-64 years; 65-74 years; and 75-84 years.

Patients in the age group of 45-54 years had maximum number of extractions (n=214, 24.62%) followed by those in the age group of 55-64 years (n=205, 23.59%). As the age of the patients increased, mean number of teeth extracted also increased. Overall, mean number of teeth extracted in sample stood at 1.41 **(Table 2)**.

On analysing the type of teeth, molars were found to be most frequently extracted teeth (49.9%) followed by anterior teeth

(26.2%). Premolars were the least to be removed (23.9%) **(Table 3)**.

Table 4 enumerates the various reasons for tooth extraction. Dental caries appeared to be the most common reason accounting for 50.51% of total extractions. Periodontitis was second major reason for tooth loss resulting in 335 extractions (38.43%).

When reasons for extraction among different age groups were analyzed, it was found that dental caries was predominant reason (24.1%) for tooth loss in age group of 35-44 years whereas periodontal disease was the most common reason (35.3%) in 45-54 years age group **(Table 5)**.

First molars were the most frequently extracted teeth (19.4%) followed by third molars (16%). Central incisors were the least extracted tooth type (8.1%) **(Table 6)**.

Table 1. Age and Gender wise distribution of subjects.

Age Group	Subjects		Total
	Male	**Female**	
15-24	24	32	56
25-34	37	57	94
35-44	74	50	124
45-54	54	82	136
55-64	76	60	136
65-74	30	22	52
75-84	10	7	17
Total	305	310	615

Table 2. Number and Percentage (%) of teeth extractions by age group.

Age Group	Number of teeth extracted	% of teeth extracted	Mean number of teeth extracted
15-24	60	6.90%	1.07
25-34	114	13.12%	1.21
35-44	168	19.33%	1.35
45-54	214	24.62%	1.57
55-64	205	23.59%	1.51
65-74	75	8.64%	1.44
75-84	33	3.80%	1.94
Total	869	100%	1.41

Table 3. Number and Percentage (%) of extractions of different teeth type in different age groups.

Age Group	Tooth type			Total
	Anteriors N (%)	**Premolars** N (%)	**Molars** N (%)	**N**
15-24	6 (10)	4 (6.7)	50 (83.3)	60
25-34	17 (14.9)	21 (18.4)	76 (66.7)	114
35-44	35 (20.8)	42 (25)	91 (54.2)	168
45-54	64 (29.9)	49 (22.9)	101 (47.2)	214
55-64	65 (31.7)	59 (28.8)	81 (39.5)	205
65-74	26 (34.7)	20 (26.7)	29 (38.6)	75
75-84	15 (45.5)	13 (39.4)	5 (15.1)	33
15-84	228 (26.2)	208 (23.9)	433 (49.9)	869

Table 4. Reasons for tooth extractions based on numbers and Percentage.

Reasons	Frequency	
	Number	**Percentage**
Dental Caries	439	50.51
Periodontal disease	334	38.43
Trauma	19	2.19
Prosthetic reason	48	5.52
Orthodontic treatment	0	0
Failed Endo	2	0.23
Pericoronitis/impacted	27	3.11
Total	869	100

Table 5. Reasons for tooth extractions in different age groups.

Age Group	Reasons							Total
	Caries N (%)	Perio N (%)	Trauma N (%)	Prosthetic N (%)	Ortho N (%)	Failed Endo N (%)	Impacted N (%)	
15-24	48 (10.9)	1 (0.3)	4 (21.1)	1 (2.1)	0 (0)	0 (0)	6 (22.2)	60
25-34	82 (18.7)	17 (5.1)	2 (0.5)	2 (4.1)	0 (0)	0 (0)	11 (40.7)	114
35-44	106 (24.1)	44 (3.2)	2 (10.5)	8 (16.7)	0 (0)	0 (0)	8 (29.6)	168
45-54	89 (20.2)	118 (5.3)	3 (5.8)	2 (4.2)	0 (0)	0 (0)	2 (7.4)	214
55-64	76 (17.3)	96 (28.7)	6 (31.6)	25 (52.1)	0 (0)	2 (100)	0 (0)	205
65-74	29 (6.6)	41 (12.3)	2 (10.5)	3 (6.2)	0 (0)	0 (0)	0 (0)	75
75-84	9 (2.1)	17 (5.1)	0 (0)	7 (14.6)	0 (0)	0 (0)	0 (0)	33
15-84	439 (100)	334 (100)	19 (100)	48 (100)	0 (100)	2 (100)	27 (100)	869

Table 6. Frequency distribution of teeth extracted.

Teeth extracted	n	%
Central incisors	70	8.1
Lateral incisors	71	8.2
Canines	87	10
First premolars	98	11.3
Second Premolars	110	12.6
First molars	169	19.4
Second molars	125	14.4
Third molars	139	16
Total	869	100

DISCUSSION

This study was carried out at Department of Dentistry, GMERS medical college and hospital, Valsad, Gujarat, India. This is a government-run medical teaching institution which mainly caters to the population of Valsad district situated in southern part of Gujarat state and Thane district situated in northern part of Maharashtra state. The study was aimed at finding out the reasons for tooth extraction in patients visiting outpatient department of dentistry of this institute.

Preservation of natural tooth is considered to be one of the main aims of oral health care and therefore, the knowledge and understanding of the reasons influencing tooth extractions may provide valuable information for planning preventive oral health care strategies [15]. World Health Organization (WHO) in its report identified good oral health as an indicator of good health and recommended various steps in order to improve oral health globally [21].

In this prospective study, we found that nearly half of the teeth (50.51%) were extracted due to dental caries and its sequelae. Periodontal disease was identified as the second most common reason accounting for 38.43% of total extractions. Similar

studies in other states such as Maharashtra [18], Uttarkhand [20] and Kerala [17] have also reported dental caries to be the most common reason for tooth loss followed by periodontal disease. The worldwide trend also suggest the similar findings except a few studies which suggested periodontal reason is more important than dental carries leading to tooth loss [9,10]. On the contrary, Ong et al. found both caries (35.4%) and periodontal disease (35.8%) to be equally common causes for tooth extraction in population of Singapore [11]. These controversial findings could be explained by differences in the characteristics of the study population, immunological and genetic factors, cultural beliefs, and socioeconomic characteristics. Immunological and genetic reasons are some of the contributory factors that may explain why some populations exposed to the same bacterial etiologic factors did not develop similar pathological conditions [22].

Highest number of teeth lost due to dental caries was in 35-44 years of age group (24.1%) whereas 45-54 years of age group had highest number of teeth removed for periodontal reasons (35.3%). Collectively, 53.7% teeth were extracted because of dental caries in patients aged less than 45 years (between 15 and 44 years). Patients who were 45 years or more (between 45 and 84 years) witnessed 81.4% of their teeth extracted due to periodontal disease. Similar finding was reported in Canadian population where more number of teeth was extracted for periodontal reason than caries after 40 years of age [10].

5.5% of teeth were extracted for prosthetic reasons. This is within the range of 1% - 21.5% reported by several studies in India [17] as well as outside India [12-14,23]. As the age increased, more number of teeth was extracted for prosthetic reason and more than 52% teeth were extracted in 55-64 years age group. This finding has been validated by another researcher in Mexican population [23].

None of the teeth were extracted for orthodontic reason in the current study. This is possibly attributed to the fact that facility of orthodontic treatment is not available in the institute where this study was carried out. Therefore, this finding should be taken into consideration with caution.

In our study, first molars were most frequently extracted (19.4%) followed by third molars (16%). This could be probably due to a several facts: (a) first molars are the first permanent teeth to be erupted in oral cavity making them longest serving teeth; (b) they have a broader surface area with pit and fissures making them more susceptible to plaque accumulation and caries formation [24].

One of the greatest strength of this study is its prospective design and data collection by a single clinician at the single center. Many studies in the literature have been either retrospective in nature [15,16] or based on data collected from several dental practitioners or private dental clinics [4,6-11,14,19]. Retrospective studies are assumed to have more chances of bias since the data collection, data entry and data quality assurances were not planned ahead of time [25]. Data gathered from multiple clinicians may have chances of inter-observer variability which in turn may affect the reliability of data [26]. In our prospective study, all the data were collected by a single clinician thereby eliminating chances of potential bias.

CONCLUSION

In the present study, dental caries and periodontal disease were found to be major reasons for tooth loss. These two causes together accounted for over 88% of tooth extractions in study population. Based on this finding, we recommend that preventive oral health strategies in southern part of Gujarat state should be designed to minimize the impact of caries and periodontal disease in this population. We also found that dental caries had major impact on tooth loss in population younger than 45 years and periodontal disease became more prominent in those who were 45 years or older. This fact should be kept in mind while planning preventive programs and more emphasis should be given either on dental caries or on periodontal disease based on age of the target population.

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