Journal of Contemporary Issues in Business and Government Vol. 27, No. 2, 2021
https://cibg.org.au/

P-ISSN: 2204-1990; E-ISSN: 1323-6903
DOI: 10.47750/cibg.2021.27.02.303

Reasons for extraction of permanent teeth - An institutional study

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Abstract: Cause for tooth extraction had large geographical and cultural differences in different Countries. A decrease in the number of teeth can serve as an indicator of socio-economic and oral hygiene level. A reduction in the number of teeth may result in poor dietary habits and deterioration of quality of life. The aim of this study was to investigate the primary reasons for extraction of permanent teeth and to evaluate its association with age, gender among patients treated in Saveetha Dental College and hospital. In this retrospective cross-sectional study, digital case records of all patients reported to saveetha dental college and hospital from June 2019 to March 2020 were reviewed. All adult patients who underwent extraction of teeth were included in the study. Demographic details of patients and the reasons for extraction of the permanent tooth were recorded from digital case records, clinical photographs and radiographs. Retrieved data was analysed using IBM SPSS Software Version 23.0. Descriptive statistics and tests of association for categorical variables by Chi square tests were done and results were obtained. P value < 0.05 was considered statistically significant. The common reason for the extraction of permanent teeth was dental caries (34.2%). Tooth extraction was more in the age group 18-35 years (41.2%) and the most common reason was dental caries (41.7%). The association between age and reasons for tooth extraction was statistically significant.($p<0.001$).Tooth extraction was more in the males (58.6%) compared to females (41.3%) and the most common reason for extraction in the males was dental caries (31.3%) and in females was dental caries (38.2%). The association between gender and reasons of tooth extraction was statistically significant($p<0.001$). The association between age and gender of the patients undergoing extraction of permanent teeth was also statistically significant.($p<0.001$). Within the limits of the study, dental caries was the most common reason for the extraction of permanent teeth. Males underwent more extractions than females and the predominant age group undergoing extraction of teeth were 18-35 years. This fact should be kept in mind while planning preventive programs and more emphasis should be given for prevention of dental caries or periodontal disease based on age of the target population.

Keywords: extraction, dental caries, periodontitis, reasons, permanent teeth

INTRODUCTION

India being a developing country, most of the people undergo dental extractions even if the teeth can be saved. Tooth extraction is the most common surgical procedure performed in the oral and maxillofacial surgery department. Extraction seems to be a simple procedure, but it has a significant impact on the quality of life in an individual's life. Quality of general health is totally hampered after extraction of teeth and it also affects the patients psychology.

Dental extractions are the commonly performed procedures in dental clinics with complications such as pain, swelling and alveolar osteitis. An ideal tooth extraction is defined as painless removal of the whole tooth or tooth root with minimal trauma to the investing tissues so that there will be eventual wound healing and no postoperative prosthetic

problem.(Kumar, 2017b)(Jesudasan, Abdul Wahab and Muthu Sekhar, 2015) Loss of teeth continues to be a major public health problem worldwide. (Khalil and Aleisa, 2013) (Kumar and Rahman, 2017) Tooth loss impairs the quality of life, often substantially, and affects the well-being of the person. Missing teeth can interfere with chewing ability, diction, and esthetics. Low self-esteem related to tooth loss can not only hinder an individual's ability to socialize, hamper the performance of work and daily activities, and lead to absence from work, but also affect the overall quality of life of an individual. (Patturaja and Pradeep, 2016) Dental extraction should always be the last choice of treatment. In many countries even though there is a progress in

technical procedures, tooth extraction is one of the most widely performed procedures. (Alomari, Khalaf and Al-Shawaf, 2013)(Christabel et al., 2016) To improve oral health outcomes, it is quite essential to understand the reasons behind tooth extraction. (Jafarian and Etebarian, 2013)(Marimuthu et al., 2018)

Cause for tooth extraction had large geographical and cultural differences in different Countries. Extractions of permanent teeth are 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 (Park et al., 2019)(Packiri, 2017) A decrease in the number of teeth can serve as an indicator of socio-economic and oral hygiene level. (Aida et al., 2006)(Patil et al., 2017) A reduction in the number of teeth may result in poor dietary habits and deterioration of quality of life. (Chrysanthakopoulos, 2011)(Rao and Santhosh Kumar, 2018)

An understanding of the reasons for extraction of teeth is essential to improve oral health outcomes.(Jain et al., 2019) A large number of cross-sectional studies have investigated tooth loss in different Countries.(Abhinav et al., 2019)(Kumar and Sneha, 2016) Dental caries was the main cause for tooth loss (Chestnutt, Binnie and Taylor, 2000)(Kumar, 2017c) but a few studies revealed the greater proportion of tooth extractions were due to periodontal disease. It is evident that tooth extraction because of dental caries is significantly higher in irregular dental attenders than regular attenders who seek dental treatment. (Chava, Nuvvula and Nuvvula, 2015)(Kumar, 2017a)

By identifying the main causes and prediction for tooth loss, it may be possible to limit future extractions and highlight the crucial role of prevention.(Chava, Nuvvula and Nuvvula, 2015; Abhinav, Sweta and Ramesh, 2019)Our team has rich experience in research and we have collaborated with numerous authors over various topics in the past decade (Deogade, Gupta and Ariga, 2018; Ezhilarasan, 2018; Ezhilarasan, Sokal and Najimi, 2018; Jeevanandan and Govindaraju, 2018; J et al., 2018; Menon et al., 2018; Prabakar et al., 2018; Rajeshkumar et al., 2018, 2019; Vishnu Prasad et al., 2018; Wahab et al., 2018; Dua et al., 2019; Duraisamy et al., 2019; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Gheena and Ezhilarasan, 2019; Malli Sureshbabu et al., 2019; Mehta et al., 2019; Panchal, Jeevanandan and Subramanian, 2019; Rajendran et al., 2019; Ramakrishnan, Dhanalakshmi and Subramanian, 2019; Sharma et al., 2019; Varghese, Ramesh and Veeraiyan, 2019; Gomathi et al., 2020; Samuel, Acharya and Rao, 2020)

Therefore, the purpose of this research was to investigate the reasons for extraction of permanent teeth, and its association with age and gender of the patients treated in our institution.

MATERIALS AND METHODS

Study design and study setting

This retrospective study was conducted among dental patients in the department of oral and maxillofacial surgery, Saveetha dental college and hospital, Saveetha university, Chennai, to evaluate the reasons for extraction of permanent teeth from June 2019 to March 2020. The study was initiated after approval from the institutional review board. (SDC/SIHEC/2020/DIASDATA/0619-0320)

Study population and sampling

Inclusion criteria for the study were all the patients above 18 years of age who underwent dental extractions. The exclusion criteria were missing or incomplete data. After assessing details of 86,000 patients in the university patient data registry, consecutive case records of adult patients who had undergone 2046 dental extractions were included in the study and evaluated. Cross verification of data for errors was done with the help of an external examiner.

Data collection and tabulation

A single calibrated examiner evaluated the digital case records of the adult patients who have undergone dental extractions from June 2019 to March 2020. Demographic details like age, gender and reasons for dental extractions were also recorded from digital case records, clinical photographs and radiographs. All consecutive case records of patients who underwent extraction were included in the study, their data were retrieved and tabulated.

Statistical Analysis

The collected data was validated, tabulated and analysed with Statistical Package for Social Sciences for Windows, version 23.0 (SPSS Inc., Chicago, IL, USA) and results were obtained. Categorical variables were expressed in frequency and percentage; and continuous variables in mean and standard deviation. Chi-square test was used to test associations between categorical variables. P value < 0.05 was considered statistically significant.

RESULTS AND DISCUSSION

In our study, 2046 permanent teeth were extracted among patients and the reasons for the extractions were evaluated. The reasons for extraction were dental caries (34.2%), followed by root stumps (16.5%), periodontitis (15%), impacted teeth (10%), non-carious lesion (8.9%), orthodontics extraction (5%), vertical fracture (3.5%),

failure of Root Canal Treatment (RCT) (2%), not willing for RCT (2%) retained deciduous teeth (0.8%), periapical pathology (0.7%), full mouth rehabilitation (0.2%) and trauma (0.2%).The most common reason for tooth extraction was dental caries (34.2%). [Figure 1].

Tooth extraction was more common in the age group 18-35 years (41.2%), followed by 51-65 years (29.5%), 66-80 years (19.4%), and 36-50 years (9.8%). The reasons for extraction in the age group of 18-35 years were dental caries (41.7%), impaction (22.1%), root stumps (13.9%), orthodontic extraction (12.5%), retained deciduous teeth (1.7%), vertical fracture (1.5%), periapical pathology (1.4%), not willing for RCT(1.4%), periodontitis (1.1%), trauma (0.5%), non carious lesion(0.2%) and supernumerary teeth (0.1%). The reasons for extraction in the age group of 36-50 years were dental caries (38.6%), root stumps (17.8%), not willing for RCT(12.3%), periodontitis (10.3%), non carious lesion (5.9%), failure of RCT (0.9%), impaction (0.4%), periapical pathology (0.4%) and supernumerary teeth (0.4%). The reasons for extraction in the age group of 51-65 years were dental caries (37.2%), periodontitis (25.6%), root stumps (12.4%), non carious lesion (9.6%), failure of RCT (5.2%), vertical fracture (3.9%), impaction (3.8%), not willing for RCT (0.6%), full mouth rehabilitation (0.4%), periapical pathology (0.4%), trauma (0.1%) and supernumerary teeth (0.1%) The reasons for extraction in the age group 66-80 years were periodontitis (30.4%), non carious lesion (27.9%), root stump(27.7%), dental caries (11.3%) and vertical root fracture (2.5%). On comparing the association between age and reasons for tooth extraction, the results were statistically significant. Pearson's Chi square value-1471.61, p=0.000 (<0.05). Thus a statistically significant association was present between age of the patients and the reasons for tooth extraction. Tooth extraction was common in the age group 18-35 years (41.2%) and the most common reason was dental caries (41.7%). [Table 1, Figure 2].

Tooth extraction was more common in males (58.7%) followed by females (41.3%). The reasons for extraction in the males were dental caries (31.3%), root stump (17%), periodontitis (16.8%), non carious lesion (10.5%), impaction (9.1%), orthodontic extraction (4.6%), vertical fracture (4.2%), failure of RCT (1.9%), not willing for RCT (1.4%), periapical pathology (0.8%), retained deciduous teeth (0.7%), trauma (0.4%), full mouth rehabilitation (0.4%) and supernumerary teeth (0.1%). The reasons for extraction in the females were dental caries (38.2%), root stump (15.8%), periodontitis (12.4%), impaction (11.9%), non carious lesion (6.6%), orthodontic extraction (5.9%), not willing for RCT (2.8%), vertical fracture (2.4%), failure of RCT (2.1%), periapical pathology (0.7%), retained deciduous teeth (0.7%) and supernumerary teeth (0.1%). On comparing the association between gender and reasons for tooth extraction, the results were statistically significant. Pearson's Chi-square value-45.74; p=0.000 (<0.05). Thus a statistically significant association was present between gender of the patients and the reasons for tooth extraction. Tooth extraction was more in the males (58.6%) compared to females (41.3%) and the most common reason for extraction in the males was dental caries (31.3%) and in females was dental caries (38.2%). [Table 2, Figure 3].

Tooth extraction was more common in the age group of 18-35 years (41.2%) with males undergoing more extractions (51.9%) than females (48%). In the age group of 36-50 years, males (52.4%) underwent more extractions than females (47.5%). In the age group of 51-65 years males (62%) underwent more extractions than the females (38%). In the age group of 66-80 years, 71.3% of males and 28.7% females have undergone extractions. On evaluating the association between age and gender of patients undergoing dental extractions, the results were statistically significant. Pearson's Chi-square value-47.66; p=0.000 (<0.05). Thus a statistically significant association was present between the age and the gender of the patients. Tooth extraction was more in the age group of 18-35 years (41.2%) and in this age group males underwent more extractions (51.9%) compared to females (48%). [Table 3, Figure 4].

In our study, the most common reason for extraction of teeth was dental caries. Tooth extraction was more common between the age group 18-35 years and the common reason for extraction was dental caries. Whereas, in patients in the age group of 66-80 years, periodontitis (30.4%) was the most common reason for tooth extraction. There was a statistically significant association present between age and reasons for tooth extraction. Males underwent more dental extractions than females and the most common reason for extraction both in males and females was dental caries. There was a statistically significant association present between gender and reasons for tooth extractions. Tooth extraction was more in the age group 18-35 and in this age group males underwent more extractions compared to females. There was a statistically significant association present between age and gender of the patients undergoing extractions of permanent teeth.

According to Agaholm (Agerholm and Sidi, 1988) and Shaninari et al (Al-Shammari et al., 2006) the main reason for extraction was dental caries. On the contrary Ong G (Ong, Yeo and Bhole, 1996) stated that periodontal disease was the reason for extraction. The reason behind the different causes for extraction in different locations are due to diet, socio-economic factors, the level of dental awareness and fluoridation.

According to Mc Caul (McCaul, Jenkins and Kay, 2001), men accounted for more loss of teeth than women. The number of extractions was higher in males with both dental caries and periodontal diseases as the reasons for extraction. This can be attributed to a number of facts, including differences in dental attendance, fear of dentists among males and females, and difference in dietary pattern between homemakers and working men. The study also stated that men had a lack of interest in restorative treatment.

According to Chen Sc (Chen et al., 2008) the more common age of extraction was above 65 years. The reasons for extraction at an older age is because of the ill oral hygiene, not willing for restorative treatment because of less knowledge. The main reasons for extraction to be performed at a younger age are for orthodontic treatment, extraction of the retained deciduous teeth and also extraction of the impacted molars. Dental caries can be another main cause of extraction at this age because of the dietary habits as well as a more cariogenic diet and easier access to refined sugars and sugar products. It was also observed in several studies that periodontitis was the main reason for extraction of teeth in the elderly age group, which is similar to our study results.

In government sectors, extractions were a dominant part of treatment and irrespective of their dental needs, this may be because of heavy flow of patients, shortage of workforce, lack of infrastructure, and lack of time for the dentists. But in the teaching dental hospital, in the process of imparting good practical knowledge to the students, each patient is thoroughly checked and every other tooth treated along with their chief complaint. (Marcus, Kaste and Jackson Brown, 1994)

The knowledge and understanding of the reasons for tooth extractions will provide information for planning preventive oral health care options since preservation of natural teeth is considered to be one of the main aims of oral health care.

The limitations of the study included patients from a particular geographical area as it was an institutional study. This has to be eliminated in the future by conducting multicentre study with large sample size and more knowledge about restorative treatment should be given.

Our institution is passionate about high quality evidence based research and has excelled in various fields ((Pc, Marimuthu and Devadoss, 2018; Ramesh et al., 2018; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Ramadurai et al., 2019; Sridharan et al., 2019; Vijayashree Priyadharsini, 2019; Mathew et al., 2020)

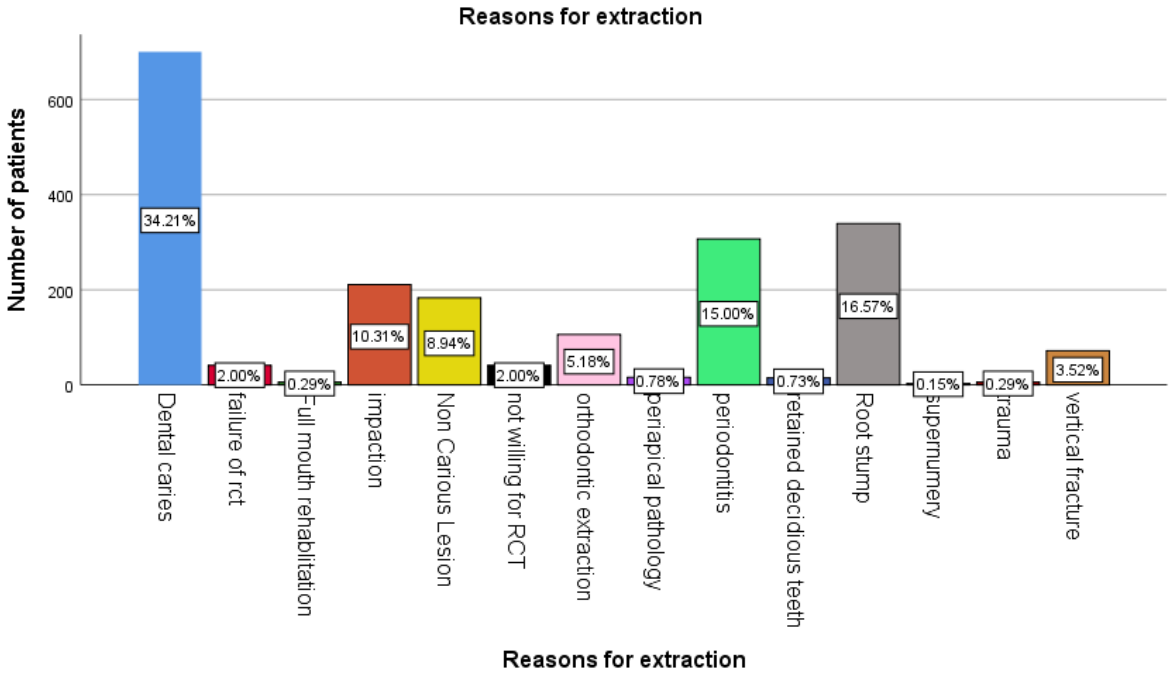

Fig.1: Bar chart depicting the distribution of the reasons for extraction of permanent teeth. X axis represents the reasons for extraction of permanent teeth and Y axis represents the number of patients who underwent extractions of permanent teeth. The most common reason for tooth extraction was dental caries (34.2%).

Table 1

REASONS FOR EXTRACTION	**AGE n(%)**				Total
	18-35	36-50	51-65	66-80	
Dental caries	352(41.7%)	78(38.6%)	225(37.2%)	45(11.3%)	700(34.2%)
failure of rct	7(0.8%)	2(0.9%)	32(5.2%)	0(0%)	41(2%)
Full mouth rehabilitation	3(0.3%)	0(0%)	3(0.4%)	0(0%)	6(0.2%)
impaction	187(22.1%)	1(0.4%)	23(3.8%)	0(0%)	211(10.3%)
Non Carious Lesion	2(0.2%)	12(5.9%)	58(9.6%)	111(27.9%)	183(8.9%)
not willing for RCT	12(1.4%)	25(12.3%)	4(0.6%)	0(0%)	41(2%)
orthodontic extraction	106(12.5%)	0(0%)	0(0%)	0(0%)	106(5.1%)
periapical pathology	12(1.4%)	1(0.4%)	3(0.4%)	0(0%)	16(0.7%)
periodontitis	10(1.1%)	21(10.3%)	155(25.6%)	121(30.4%)	307(15%)
retained deciduous teeth	15(1.7%)	0(0%)	0(0%)	0(0%)	15(0.7%0
Root stump	118(13.9%)	36(17.8%)	75(12.4%)	110(27.7%)	339(16.5%)
supernumerary	1(0.1%)	1(0.4%)	1(0.1%)	0(0%)	3(0.1%)
trauma	5(0.5%)	0(0%)	1(0.1%)	0(0%)	6(0.2%)
vertical fracture	13(1.5%)	25(12.3%)	24(3.9%)	10(2.5%)	72(3.5%)
Total	843(41.2%)	202(9.8%)	604(29.5%)	397(19.4%)	2046
Chi Square Test					
	Value		df	Asymptotic significance (2-sided)	
Pearson chi square	1471.619		48	0.000	

Table 1: Table depicting the association between the age group of the patients and the reasons for extraction of permanent teeth. Pearson's Chi square test was done with a value of 1471.61, p=0.000 (<0.05) and the results were statistically significant.Thus a statistically significant association was present between age and reasons for extraction of permanent teeth. It was found that the age group which underwent more extractions was 18-35

years(41.2%) and the most common reason was dental caries(41.7%).

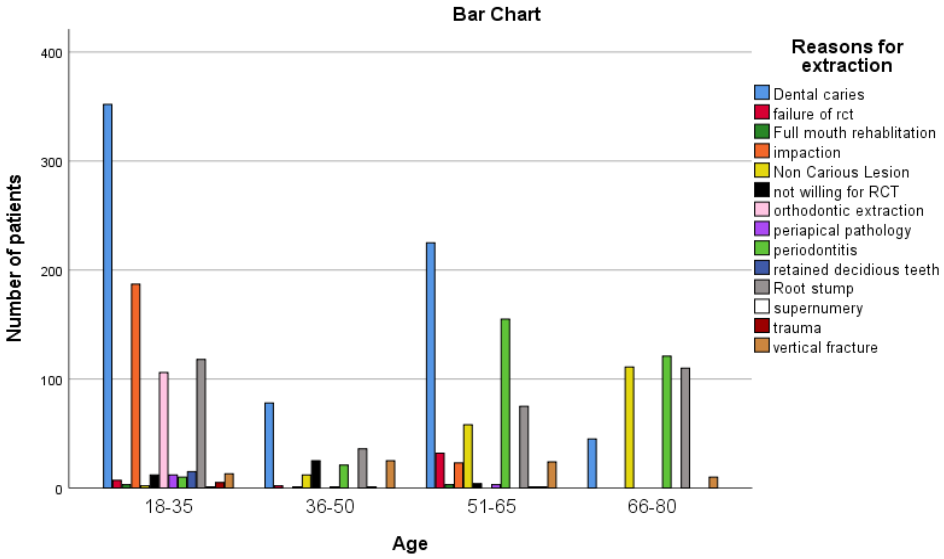

Fig.2: Bar chart depicting the association between age group and reasons for extraction of permanent teeth. X axis denotes the age of the patient and Y axis denotes the number of patients who underwent extractions of permanent teeth. Pearson's Chi square test was done with a value of 1471.61, p<0.001 (<0.05) and the results were statistically significant.Thus a statistically significant association was present between age and reasons for extraction of teeth. Tooth extraction was common in the age group 18-35 years(41.2%) and the most common reason was dental caries (41.7%).

Table 2

Reasons for extraction	Gender		
	Female	Male	Total
Dental caries	323(38.2%)	377(31.3%)	700(34.2%)
failure of rct	18(2.1%)	23(1.9%)	41(2%)
Full mouth rehabilitation	0(0%)	6(0.4%)	6(0.2%)
impaction	101(11.9%)	110(9.1%)	211(10.3%)
Non Carious Lesion	56(6.6%)	127(10.5%)	183(8.9%)
not willing for RCT	24(2.8%)	17(1.4%)	41(2%)
orthodontic extraction	50(5.9%)	56(4.6%)	106(5.1%)
periapical pathology	6(0.7%)	10(0.8%)	16(0.7%)
periodontitis	105(12.4%)	202(16.8%)	307(15%)
retained deciduous teeth	6(0.7%)	9(0.7%)	15(0.7%)
Root stump	134(15.8%)	205(17%)	339(16.5%)
supernumerary	1(0.1%)	2(0.1%)	3(0.1%)
trauma	0(0%)	6(0.4%)	6(0.2%)

vertical fracture	21(2.4%)	51(4.2%)	72(3.5%)
Total	845(41.3%)	1201(58.6%)	2046
Chi Square Test			
	Value	df	Asymptotic significance(2-sided)
Pearson chi square test	45.742	12	0.000

Table 2: Table depicting the association between gender and reasons for extraction of permanent teeth. Pearson's Chi-square value-45.74; p=0.000 (<0.05). Thus a statistically significant association was present between gender and tooth extraction. Tooth extraction was more in the males (58.6%) compared to females (41.3%) and the most common reason for extraction in the males was dental caries (31.3%) and in females was dental caries (38.2%).

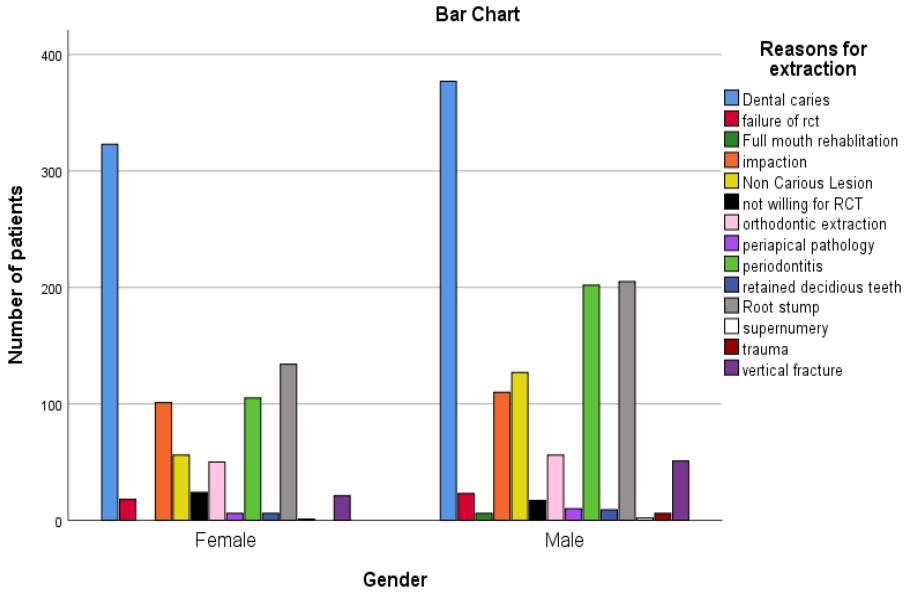

Fig.3: Bar chart depicting the association between gender and reasons for extraction of permanent teeth. X axis denotes the gender of the patient and Y axis denotes the number of patients who underwent extractions of permanent teeth. Pearson's Chi-square value-45.74; p=0.000 (<0.05). Thus a statistically significant association was present between gender and tooth extraction. Tooth extraction was more in the males (58.6%) compared to females (41.3%) and the most common reason for extraction in the males was dental caries (31.3%) and in females was dental caries (38.2%).

Table 3

Age	Gender		Total
	Female	Male	
18-35	405(48%)	438(51.9%)	843(41.2%)
36-50	96(47.5 %)	106(52.4%)	202(9.8%)
51-65	230(38%)	375(62%)	605(29.5%)

66-80	114(28.7%)	283(71.3%)	39(19.4%)
Total	845(41.3%)	1202(58.6%)	2046
Chi square test			
	Value	df	Asymptotic significance (2-sided)
Pearson chi square test	47.66	3	0.000

Table 3: Table depicting the association between age and gender of the patients who underwent extraction of permanent teeth. Pearson's Chi-square value-47.66; p=0.000 (<0.05). Thus a statistically significant association was present between the age and the gender of the patients. Tooth extraction was more in the age group 18-35 (41.2%) and in this age group males underwent more extractions (51.9%) compared to females (48%).

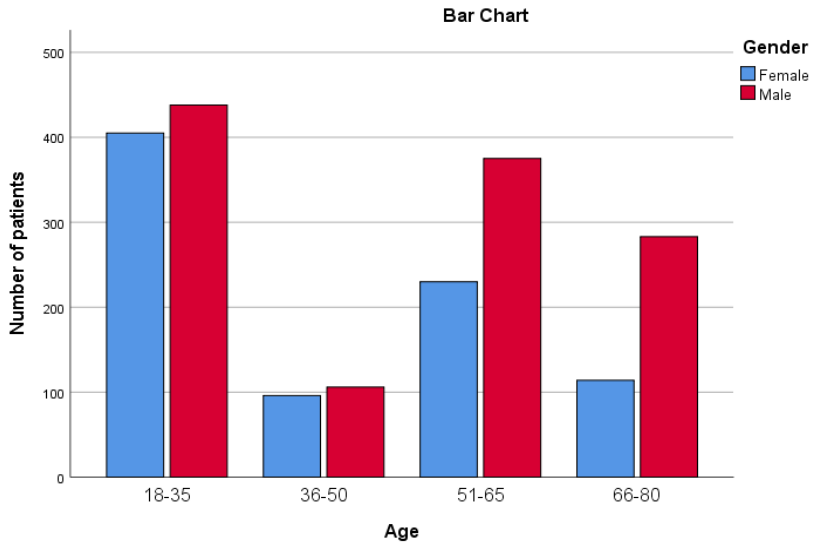

Fig.4: Bar chart depicting the association between age and gender of the patients undergoing extraction of permanent teeth. X axis denotes the age of the patient and Y axis denotes the number of patients who underwent extractions of permanent teeth in males and females. Pearson's Chi-square value-47.66; p=0.000 (<0.05). Thus a statistically significant association was present between the age and the gender of the patients. Tooth extraction was more in the age group 18-35 (41.2%) and in this age group males underwent more extractions (51.9%) compared to females (48%).

CONCLUSION

Within the limits of the study, dental caries was the most common reason for the extraction of permanent teeth. Males underwent more extractions than females and the predominant age group undergoing extraction of teeth were 18-35 years. This fact should be kept in mind while planning preventive programs and more emphasis should be given for prevention of dental caries or periodontal disease based on age of the target population.

Authors contributions

First author (Keerthana. R) performed the analysis, and interpretation and wrote the manuscript. Second author (Dr. Santhosh Kumar) contributed to conception, data design, analysis, interpretation and critically revised the manuscript. Third author (Dr. Manjari Chaudhary) participated in the study and revised the manuscript. All the three authors have discussed the results and contributed to the final manuscript.

ACKNOWLEDGEMENTS

We thank Saveetha Dental college for allowing us to access the patient's records and complete the research study.

CONFLICT OF INTEREST

No conflict of interest.

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