Research Article

Evaluation of Causes of Tooth Extraction and Associated Factors Among Patients Visiting the Oral and Maxillofacial Surgery Department of PIDC

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Abstract

This study investigated the most common cause leading to tooth extraction in the local population and identified the most commonly extracted tooth. Additionally, the researchers investigated the existence of any significant association between the variables of age, gender and ethnicity with the causes of tooth extraction.

Methodology: 50 patients involving a span of 8 months in 2021 were selected. Records of a total of 59 teeth were examined of this sample and the information regarding their ethnicity, gender and age was duly noted. Additionally, the patient's medical history, extracted tooth number and the causes of extraction were also noted. The data was compiled and analysed.

Result: The main cause of extraction was dental caries and its sequelae (39%). It was also found that the variables of age, gender and ethnicity correlated very weakly and the relationship was not significant, in all cases.

Conclusion: The prime reason for tooth extraction is caries and its sequelae followed by periodontal diseases. Age, gender and ethnicity do not correlate significantly with causes of extraction.

Keywords: Causes; Extraction; Teeth; Caries; Periodontal Disease

Introduction

There are numerous factors for tooth extraction, thus, an understanding of the underlying factor that leads to a tooth being extracted is vital to not only prevent the loss of a tooth but also enhance oral health outcomes as a whole. With proper statistical analysis, it is possible for us to extrapolate the data and be able to pay special attention to the root cause of the problem which in hope will stop the progression altogether instead of just managing the situation as symptoms arise.

The aim of this study is to assess the reasons a tooth is required to be extracted. Along with this, we would be able to statistically classify the most common cause leading to tooth extraction in the local population and the most commonly extracted tooth in the oral cavity. Besides that, with the data collected, we could also associate the relationship between age, gender and ethnicity to the prevalence of the cause of tooth extraction. These statistics would potentially be able to help us to customise a preventive treatment plan that is both efficient and specific to the surrounding population [2].

The basis of conducting this study is to establish the development of common aetiology that leads to the extraction of a tooth. This study will be able to help us obtain a statistical overview of the factors contributing to tooth extraction [3]. With this, we can improve our understanding of the issue in hand regarding the reasons behind tooth extraction and then work on methods to tackle

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this problem. Besides that, this can play a significant role in raising proper awareness within the community regarding the issues that could eventually comprise their overall oral health [4]. The influence of oro-dental disease upon the whole community cannot be overlooked as it plays an adverse role on general health too.

Hence, our study will provide a baseline data as a support to initiate or strengthen programmes aimed at the prevention of dental diseases and to educate the community that it is not a myth but a proven fact that some of the most basic of oral hygiene care could actually prevent the loss of a tooth. We would be also able to instil that with routine dental care to maintain good oral hygiene and constant screening would prevent most if not all complications that arise from extraction of a tooth.

Materials and Methods

The current research was carried out as a descriptive cross-sectional type of study starting from January to August 2021. A purposive sampling of 50 case sheets of patient's data was drawn from the Department of Oral and Maxillofacial Surgery of Penang International Dental College, Malaysia.

The inclusion criteria

- Adult patients requiring extraction of permanent teeth
- Patients undergoing extraction for orthodontic treatment. If the tooth is grossly decayed or had deep caries or even with severely periodontal involvement, then it would not be classified as an orthodontic extraction but as the later disease.
- Surgical extraction of impacted teeth
- Adults who had an extraction of retained deciduous teeth.

The case sheets were collected from the existing data of patients who underwent extraction in the Department of Oral and Maxillofacial Surgery of Penang International Dental College, Malaysia. From the case sheet, data such as age, sex, ethnicity, compromising disease and tooth number were collected. They were then grouped by respective categories which enabled us to study the information collected.

The patients are assigned numbers and no identifying information of patients were collected to protect the confidentiality of the patients. With the input data obtained, the relationships between variables and percentage of common causes of tooth extraction along with the percentage of common tooth that was extracted were analysed.

The data was entered in a spreadsheet and analysed using the SPSS software (version 28.0). The relationships of the categorical background variables, such as the age and causes of tooth extraction, gender and causes of tooth extraction, ethnicity and causes of tooth extraction were analysed using the Pearson correlation analysis, while the percentage of the most common causes of extraction and the most common tooth number extracted were analysed using Microsoft excel (latest version year 2020) using the pct test.

Results

To begin analysing our data, we enumerated all the teeth extracted by patients who visited the Department of Oral and Maxillofacial Surgery in Penang International Dental College, Penang during the period of study. We have a compilation of 50 patients that visited our department during the phase of 8 months. Out of which, the percentage of female patients that underwent extraction was higher which is 60% (n = 30) compared to the percentage of males who underwent extraction which is 40% (n = 20) (Figure 1).
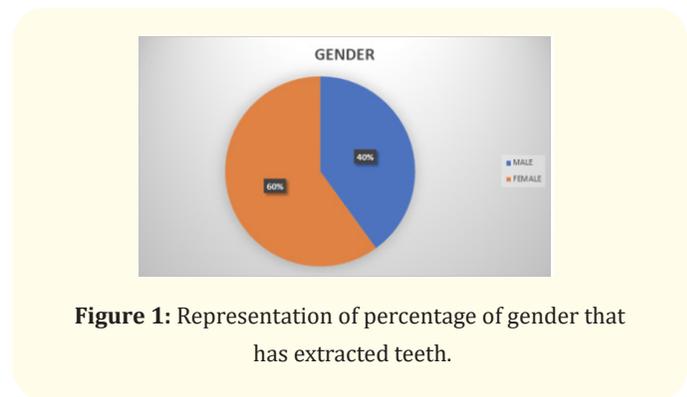

Figure 1: Representation of percentage of gender that has extracted teeth.

Among the study population, the majority of the extractions belonged to the age group of 40 to 49 and 50 to 59 with covering 25.4% for each of the age group. Overall, the females in the age group of 40 to 49 and 50 to 59 had a higher percentage of teeth extracted compared to males or any other age group, with a percent-

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age of 26.5% and 29.4% respectively. Patients less than 20 years of age underwent the least number of extractions with a percentage of 5.1% (Figure 2, Figure 3).
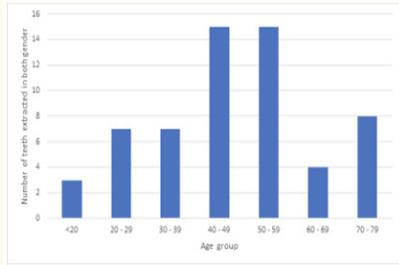

Figure 2: Representation of extracted teeth by age group.
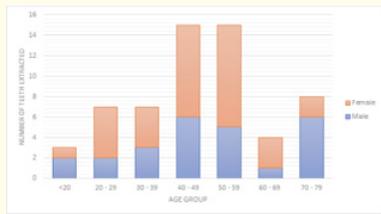

Figure 3: Representation of extracted teeth by age group and gender.

In the data collected for the research, the most common ethnicity that had their teeth extracted belongs to the Indian ethnicity with a percentage of 52%. The percentage of Malay, Chinese and other ethnicities that had their teeth extracted were 20%, 22% and 6% respectively (Figure 4).
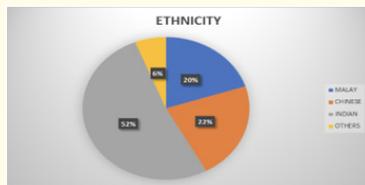

Figure 4: Representation of ethnicity of patients underwent extraction.

The most common cause of tooth extraction was found to be caries and its sequelae with a percentage of 39% followed by periodontal diseases with a percentage of 25.4%. Other causes of extraction include root stump (22%), trauma to tooth (5.1%) and presence of abscess (5.1%). The other reasons teeth were extracted include calcified canal and retained deciduous tooth. Looking at a more specific aspect, localised chronic periodontitis is the main reason that leads to a tooth being extracted with a percentage of 24.5% (Figure 5, Figure 6).
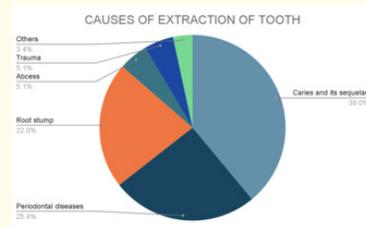

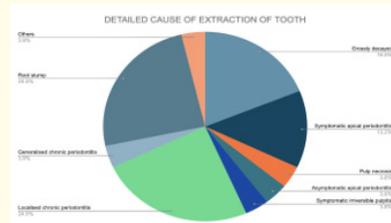**Figure 5:** Common causes of teeth extraction.

Figure 6: Specific causes of teeth extraction.

Compromising diseases could be one of the causes of tooth extraction. Patients' medical history were taken into account before they underwent extraction thus were used in this study. Out of 50 patients, 32 of them with a percentage of 64% had no compromising diseases yet had to undergo extraction. While seven patients with a history of hypertension with a percentage of 14% had to undergo extraction. There were six patients who had diabetes who underwent extraction with a percentage of 12%. Specifically, two patients with gastritis with a percentage of 4% had undergone tooth extraction. Other than that, there were also two patients with oral growth (fibroma and leukoplakia) with a percentage of 4%

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who had undergone tooth extraction. Meanwhile, only one patient with other compromising disease (hypotension, hypothyroidism) compromising disease with a percentage of 2% undergo tooth extraction (Figure 7).
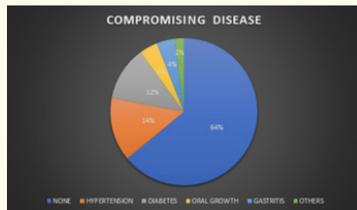

Figure 7: Representation of presence of compromising diseases among patients who underwent extraction.

Teeth belonging to the mandibular posterior quadrant are the most usual teeth that underwent extraction with a percentage of 37.2%. With a percentage of 28.8%, teeth belonging to the maxillary posterior is the second most common quadrant that underwent extraction. Maxillary anterior and mandibular anterior were the least teeth that underwent extraction with a percentage of 16.9% for both (Figure 8).
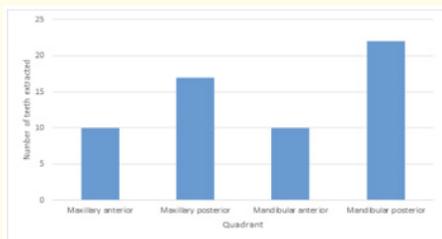

Figure 8: Representation of teeth underwent extraction classified as quadrants.

There is a female predominance in caries, root stump, abscess, trauma and others. The male leads in terms of the number of extractions done only in cases of periodontal disease. Among the male patients, the two causes with the highest frequency of tooth extraction are caries and periodontitis at 36% each. Meanwhile among the females, it seems to have a higher case of the tooth extraction due to caries at 41.1% and root stump at 23.3%. Periodontal disease comes in third highest at 17.6% (Figure 9).
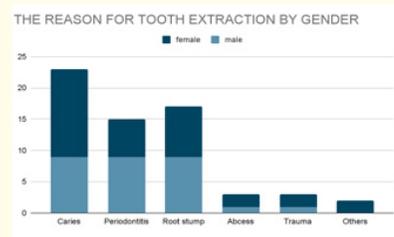

Figure 9: Representation of common causes of extraction by gender.

Among Malay, Chinese, Indian and other ethnicities, caries and its sequelae were found to be the highest to occur in Chinese with a percentage of 54.5%. While periodontitis was found to be most common among Indians with a percentage of 37.1%. Root stump was found to be common among other ethnicities with a percentage of 66.7%. Other than that, abscess was found to be common among the Chinese with a percentage of 18.2%. Trauma was also most common among the Chinese with a percentage of 9.1%. Meanwhile, other reasons appeared to be most common among the Malays with a percentage of 10% (Figure 10).
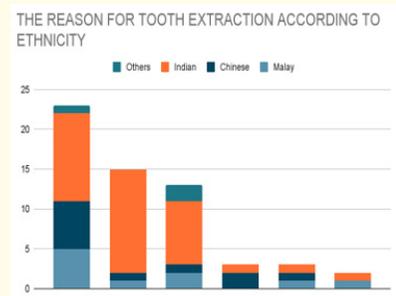
Figure 10: Representation of common causes of extraction by ethnicity.

Dental caries and its sequelae were found to be the main cause of extraction in the age group of 30-39 with the percentage of 21.7%. While periodontitis was found to be the main cause of extraction in the age group of 40-49 with the percentage of 40%. As for root stumps, it was found that the age group of 20-29, 40-49 and 50-59 has the same percentage of 30.8% and is the main cause of tooth extraction for that particular age group. Other than that,

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abscess was found to be the main cause of tooth extraction in the age group of 50-59 with the percentage of 66.7%. Meanwhile, trauma was found to be the main cause for the age group of <20, 20-29 and 40-49 with the same percentage of 33.3% and is the main cause for tooth extraction for this group. Lastly, others that include calcified teeth and retained deciduous teeth were found having the same percentage of 50% for both the age group of 20-29 and 70-79 (Figure 11).
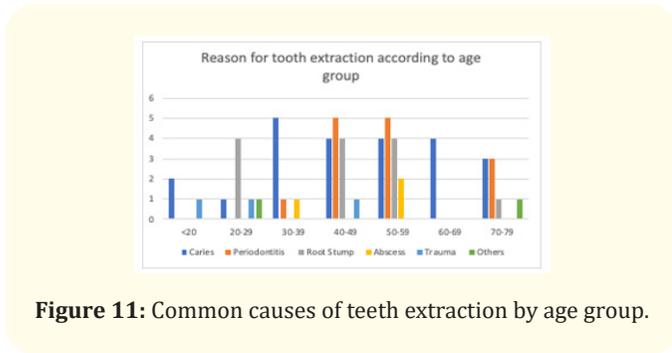

Figure 11: Common causes of teeth extraction by age group.

This study investigated the existence of any correlation and significant relationships between age, gender, ethnicity and its association with the causes of tooth extraction. Data from 59 teeth extracted from 50 patients were used in this study. In all cases, a very weak correlation was found but the relationships were found to be not significant. Between the age and causes of extraction the Pearson Correlation and significance were .011 (r = 0.011) and .934 (P = 0.934, α = 0.05), this proves that there is no significant correlation between the age and the causes of tooth extraction, ($P \geq 0.005$). Pertaining to the variables, gender and causes of extractions, it has an r value of .082 and a P value of .539 proving that there is no significant relationship, ($P \geq 0.005$). Moving on to the variables of ethnicity and causes of extraction, it shows that the r value is .199 and P = .130 proving that there is no significant relationship between ethnicity and causes of tooth extraction, (P = 0.130, α = 0.05) (Table 1).

Discussion

In this current study, we have concluded that females (60%) had a predominance in having their teeth extracted compared to males (40%). Our results tally with other researchers such as a study done in a Nigerian Urban teaching hospital by B.D Saheeb [12], a study by Syed Muhammad Abdullah Salman [13], a study by Barbato [14], study by Sundus Abdul Wadood in University of Basrah

Correlations		Age	Gender	Ethnicity	Causes
Age	Pearson Correlations	--			
	N	59			
Gender	Pearson Correlations	.100	--		
	Sig. (2-tailed)	.452			
	N	59	59		
Ethnicity	Pearson Correlations	-.214	-.098	--	
	Sig. (2-tailed)	.104	.461		
	N	59	59	59	
Causes	Pearson Correlations	.011	.082	.199	--
	Sig. (2-tailed)	.934	.539	.130	
	N	59	59	59	59

Table 1: Correlation between age, gender, ethnicity and its association with the cause of tooth extraction.

[15] and others but it is in discordance with the report by Andreia Montandon [14], study by Mohammad Jafarian [5] and others. The minute predominance in females may be due to their better health-seeking behaviour compared to males.

When we look at the most common teeth that have been extracted, we have concluded that it is the mandibular posterior teeth (n = 22,37.2%). This corresponds with other studies done [5,6] but it is in contrast with a study done by Dr. Mohammed which was done in the UAE [8]. The main reason the lower posterior teeth were indicated for extraction was due to periodontal diseases (n = 9,41%) followed by caries (n = 5, 29.4%). Most of the other studies have looked at the commonly extracted tooth from an individual aspect such as incisors, premolars, molars separated into upper and lower arches but in this study, we have categorised them into quadrants due to less data collected. The second most commonly extracted teeth were the maxillary posterior teeth. The prevalence that is seen in the posterior teeth may be due to the limited dexterity of patients to maintain oral hygiene in the back region which increases the risk of dental diseases to the posterior teeth, especially molars with the presence of deep fissures and a greater involvement in mastication.

A few of our patients have a history of compromising disease. The most common ones were diabetes and hypertension. These patients mainly had their teeth extracted due to caries (n = 4) and

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periodontal disease (n = 8). This shows that diabetes and hypertension may have a role in the cause of a tooth being extracted. The results of our study are analogous to a few studies [16,17].

The causes of extraction in our study fell into several groups, the largest portion being caries and its sequelae at 39%, followed by periodontal diseases with a percentage of 25.4%. Periodontitis is closely followed by root stump at a percentage 22%. The minority of the data comprises trauma (5.1%), abscess (5.1%) and other reasons such as tooth with calcified canal and retained deciduous tooth. A lot of our peer researchers have found identical or similar results. For example, the research done in Pakistan has found that dental caries was the leading cause of tooth extraction. In fact, it contributes more than half the causes of all tooth extraction recorded for the research at 63.1%, followed by periodontitis 26.2%, restoration failure 4.6%, trauma 3.2% and miscellaneous local pathologies [4]. Moreover, several other researchers have found that caries is the prime villain of a tooth's morbidity, closely followed by periodontitis. Every other reason comes second to it and their percentage is less than 10%. The study on the reasons of extraction of permanent teeth in general dental practices in Tehran, Iran by Muhammad Jafarian [5] found in their research that tooth loss due to caries was more than 50% as well. A study on the pattern and aetiology of tooth extraction in Northwestern Nigeria by Abdurrazaq Taiwo[6] found that dental caries and its sequelae (54.1%) were the most common reasons for extraction, followed by periodontal disease (16.5%).

On another cross-sectional study in a tertiary care hospital in Dow University of Health Sciences, Pakistan by Syed M Abdullah Salman [1], the percentage was seen to be as high as 77.5% for caries. However, a retrospective study on Pattern and Reasons for Permanent Tooth Extractions at Dental Clinics of the University of Science and Technology of Fujairah, UAE in the year 2020 [8] found that the main reason for extraction was dental caries (44.6%), but the difference is that the second highest cause is not our usual periodontal issue but third molar related extraction at 23.4%, followed by periodontal disease 18.1%. This could be because of the population group which are composed of younger patients, essentially around 20-40 years old, will tend to have greater third molar related problems compared to periodontal disease which is more frequently seen in older age group patients.

Different age groups have different common causes of tooth extraction. Patients in the age group of 30-39 underwent extraction mainly due to dental caries and its sequelae with a percentage of 21.73%. Periodontal disease was the principal cause of tooth extraction among people in the age group of 40-49, with a percentage of 40%. A study on the pattern and etiology of tooth extraction in Northwestern Nigeria by Abdurrazaq Taiwo [6] found that periodontal disease followed closely after dental caries and its sequelae being the second most common cause of tooth extraction. However, root stump affects nearly all the age groups, ranging from the age group of 20-29, 40-49 and 50-59. Root stumps affects those age groups with an average percentage of 30.76%. On the other hand, abscess was commonly seen in people of age group 50-59 and has become the main cause of tooth extraction in that age group with a percentage of 66.7%. The percentage of teeth extracted due to trauma is 33.3% in the age group of <20, 20-29 and 40-49. While calcified teeth and retained deciduous teeth have the percentage of 50% in both these age groups, 20-29 and 70-79.

Dental caries and its sequelae affects Chinese the most and has become the principal cause of tooth extraction with a percentage of 54.5%. On the other hand, periodontal disease is the most common in Indians with a percentage of 37.1%. While root stump was commonly seen among other ethnicities with a percentage 66.7%. Abscess is also common among Chinese behind the reason for teeth extraction, conquering a percentage of 18.2%. On the other hand, trauma proved to be most common among the Chinese with a percentage of 9.1%. Other studies on factors of tooth extraction among adult patients attending the exodontia department of Dhaka Dental College and Hospital [2] found that trauma was one of the factors of tooth extraction. However, these results are non-contributory due to insufficient data.

Conclusion

The result of this study indicated that caries (39%) and periodontal disease (25.4%) were the principal reasons of tooth extraction in the Department of Oral and Maxillofacial Surgery, Penang International Dental College, Malaysia. Among other causes include root stumps (22%), trauma (5.1%), abscess (5.1%) and other reasons. Further research should be done using a larger sample size. Among dental diseases, dental caries is proven to be the main culprit of tooth extraction.

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Caries, although it comprises a large percentage of the cause of tooth extraction, it is highly manageable if not avoidable with routine dental care, regular oral screening, proper brushing and correct usage of interdental cleaning aids. Periodontitis however could also be managed with proper brushing and consistent scaling. In simpler terms, the basis of visiting the dental professional twice a year is sufficient to detect any possible threat to the disease of oral cavity. Besides that, a greater consideration should be taken to reach people from all walks of life, gender and ethnicity to increase their awareness and knowledge of their own dental health and change their attitude and behaviour in relation to oral health care to ensure the longevity of the natural tooth.

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