A RETROSPECTIVE EVALUATION OF REASONS FOR TOOTH LOSS IN FULL MOUTH REHABILITATION CASES

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ABSTRACT

The aim of this study was to retrospectively evaluate the reason for tooth loss in patients undergoing full mould rehabilitation. A total of 89 data entries were taken, duplicate and missing entries were omitted. So a total of 39 entries were evaluated. The data was collected from the patient database of Saveetha dental college over a period of 10 months (June 2019 to March 2020). The results of the study were subjected to statistical analysis. Data analysis was done using SPSS software version 23.0. Chi-square association was done to evaluate the association between the age, cause, gender and quadrant for tooth loss. It was found to be statistically not significant since p >0.05. It was found that the main reason for tooth loss is due to pulpal involvement and periodontal involvement. The frequency of tooth loss is seen more in older age group individuals. The present study concluded that the most common cause of tooth loss is due to pulpal involvement.

Key words: tooth loss, pulpal involvement, periodontal involvement and trauma

INTRODUCTION

Physical attractiveness, it acts an integral part of social interaction (Berscheid and Walster, 1974; Marcus et al., 1996). Face is the most important factor which determines the aesthetic perception of a person. In the face, a smile ranks second to the eye, its most important feature while evaluating facial attractiveness. The importance of mouth represented 31%, eyes represented 34%.(Courtenay, no date),('Facial attractiveness: evolutionary, cognitive, and social perspectives’, 2002).Teeth possesses beauty all their own and also that they contribute greatly to facial beauty.

Tooth loss in adults and elderly individuals continues to be an oral health hazard that has negative impacts on quality of life and interferes with work activities (Gerritsen et al., 2010). Despite progress in the prevention of caries and periodontal disease as well as advances in restorative techniques and materials, tooth loss remains a clinical reality in the oldest old (Müller, Naharro and Carlsson, 2007).

Tooth loss implies the loss of several orofacial structures, such as bony tissues, nerves, receptors and muscles. Consequently, most orofacial functions are diminished in edentate subjects. Once teeth are lost, remodelling of the alveolar bone sets on. Within several weeks the alveolar ridge loses vertical height and rounds off. The degree of alveolar bone resorption is clearly related to the duration of edentulism (Araujo et al., 2005; Zmysłowska, Ledzion and Jedrzejewski, 2007).

Tooth loss in elderly population was reported by several studies in the past, showing a strong association with mortality(Abnet et al., 2005),(Abnet et al., 2005; Holm-Pedersen et al., 2008) and it is the ultimate endpoint for both pulpal and periodontal diseases (Hujoel, 2004),(Susin et al., 2005),(Tu and Gilthorpe, 2005).It leads to: loss of masticatory function (Hung, Colditz and Joshipura, 2005), restricting specific food intake such as vegetables and fibers (Nowjack-Raymer and Sheiham, 2007); significant phonetic changes; and loss of self esteem due to appearance impacts. Fusion of all these aspects collapses into a significant reduction in the quality of life of these subjects, as previously reported (Cunha-Cruz, Hujoel and Kressin, 2007). Missing teeth can interfere with chewing ability, diction, and esthetics. Low self-esteem related to tooth loss can hinder an individual's ability to socialize, hamper the performance of work and daily activities, and lead to absence from work (Petersen, 2003). Caries and periodontal disease are the main reasons for tooth loss in adults.(Steele et al., 2000).

Periodontitis is considered as one of the etiologic factors contributing to tooth loss, it is hypothesized that the environment in the subgingiva plays a role on what type of microbial flora will flourish in that area, this elicits an inflammatory response from the host, which drives the condition from health to disease (Bartold, Mark Bartold and Van Dyke, 2013). Several factors such as bleeding, deep probing, clinical attachment level increase and bone loss, eventually lead to tooth loss.(Armitage and Robertson, 2009; Bartold, Mark Bartold and Van Dyke, 2013).Periodontal breakdown of a crowned tooth structure is the most common reason contributing to tooth loss (59%)(Armitage and Robertson, 2009; Bartold, Mark Bartold and Van Dyke, 2013; Dikbas et al., 2013). Other factors that contribute to tooth loss or extractions include non-restorable teeth (either from fractures or caries) (27%), or periapical lesions (12%), however 35.6% of the teeth extracted had an endodontic treatment.Some authors say, Dental caries is still the main cause of tooth loss in most developing and developed countries followed by periodontal diseases.(Manji, Baelum and Fejerskov, 1988), (Caldas, Marcenes and Sheiham, 2000), (Reich and Hiller, 1993).

Loss of teeth from the jaws is a complex and multicausal process (Brothwell, 1963). In addition to clinical causes, other factors have been associated with tooth loss, such as the dental service used, time since the last visit to the dentist, reason for seeking treatment, and lifestyle, demographic and socioeconomic factors.(Brothwell, 1963; Höfelmann et al., 2018),(Silva et al., 2009). Four primary causal factors contribute to premature loss of teeth are variations in dietary consistency(Beckett and Lovell, 1994),nutritional deficiency diseases (Stodder, Stuart-Macadam and Kent, 1994), cultural or ritual ablation (Pietruszewsky and Douglas, 2002) and trauma .The prevalence
and extent of tooth loss have decreased significantly in many countries during recent decades.(Osterberg et al., 1995),(Marcus et al., 1996).

Many studies which involved case reports (Ashok et al., 2014), surveys (Ashok and Suvitha, 2016), systematic reviews (Ganapathy, Kannan and Venugopalan, 2017), (Ganapathy, Kannan and Venugopalan, 2017; Ariga et al., 2018), (Kannan and Venugopalan, 2018), literature reviews (Venugopalan et al., 2014), (Vijayalakshmi and Ganapathy, 2016), (Subasree, Murthykumar and Dhanraj, 2016; Vijayalakshmi and Ganapathy, 2016), (Selvan and Ganapathy, 2016), In Vivo studies, (Jyothis et al., 2017), (Jain, Ranganathan and Ganapathy, 2017), (Duraisamy et al., 2019), In vitro studies (Ganapathy et al., 2016), (Ajay et al., 2017) and retrospective studies (Basha, Ganapathy and Venugopalan, 2018) were carried out by our team previously. We are currently focusing on epidemiological studies. The main objective of the study is to find the main cause of tooth loss in patients who need full mouth rehabilitation.

**MATERIALS AND METHODS**

This retrospective study has been conducted in an institutional setup at Saveetha dental college, Southern part of India. A total of 89 samples were collected after extensive searching of the patient database of saveetha dental college over a period of 10 months (June 2019 to March 2020). The ethical clearance was given by the institutional review board and the ethical clearance code (SDC/SIHEC/2020/DIASDATA/0619-0320) was given by the ethical committee of the institution). Samples with improper data and repetitions were excluded from the study. Then the final samples for analysis came up to 39. The data was then arranged and checked for the correlation between cause and location of missing tooth with age and gender among patients undergoing full mouth rehabilitation.

The collected data was cross verified by the two reviewers for errors and measures are taken to minimise sampling bias while double blind the Analyser and Reviewer. The internal and external validity of the sample selected and all the samples are selected based on a simple random sample. The data was collected and entered in the MS Excel spreadsheet and tabulated. Descriptive statistics was used to evaluate the main cause of tooth loss among patients who need full mouth rehabilitation and the association of age and gender with the causation. Statistics were carried out using SPSS Software version 23.0 by IBM. Statistical test used is Chi Square and Crosstabs data is evaluated.

**RESULTS AND DISCUSSION**

According to the age of the patient, the frequency of tooth loss in the 30 - 40 age group is due to pulpal and periodontal cause with a count of 2 followed by trauma with a count of 1. In the 41 - 50 age group the highest frequency of tooth loss is due to pulpal cause with a count of 6 followed by periodontal with a count of 1. In the 51 - 60 age group the highest frequency of tooth loss is due to periodontal cause with a count of 9 followed by periodontal with a count of 1 and in 61 - 70 age group, periodontal cause has the highest frequency with a count of 7 followed by pulpal cause with a count of 6 and trauma with a count of 1. (TABLE 1)

In age and cause correlation, the highest percentage of tooth loss is seen in 61 - 70 group, followed by 51 - 60 group, 41 - 50 group and least is seen in 30-40 group. Highest periodontal cause of tooth loss is seen in the 51 - 60 age group followed by the 61 -70 age group, 30 - 40 age group and least in 41 - 50 age group with a percentage of 23.08%,17.95%,5.13% and 2.56% simultaneously. Pulpal cause of tooth loss is seen equally in 41 - 50 and 61 - 80 age groups with a percentage of 15.38% followed by 51 - 60 age group with 7.69% and least in 30 -40 age group with 5.13%. Trauma cause of tooth loss is seen equally in all the 3 groups except 41 -50 age group, no case of trauma has been reported in 41 - 50 age groups. Association between the age of the patient and the total number of cases reported was done using Chi square test. (Chi-Square Value =8.559 and p-value = .638) and found to be statistically nonsignificant. (FIGURE 1)
According to the gender of the patient, the frequency of tooth loss in males is due to periodontal cause followed by pulpal and trauma, with frequency of 10.8, 8.4, and 1 respectively and in females the main cause of tooth loss is due to pulpal and periodontal cause with account of 9 and trauma with account of 2. (TABLE 2)

In gender and the cause of tooth loss correlation, females are reported with slight increases than males. Among females pulpal and periodontal causes are reported equally with a percentage of 23.08% and least is trauma with 5.13%. In males periodontal cause of tooth loss is more than pulpal cause and least is by trauma. With a percentage of 25.64%, 20.51 and 2.56% simultaneously. Association between the gender of the patient and the total number of cases reported was done using Chi square test (Chi-Square value = .419 and p-value = .928) and found to be statistically nonsignificant and there was no greater difference between men and women pertaining to tooth loss. (FIGURE 2).

According to the location of teeth, in the upper arch only case reported for tooth loss is trauma with a count of 1. In lower arch, periodontal cause has the highest frequency with a count of 3 followed by pulpal cause with a count of 1 and in both arch cases pulpal and periodontal cause are having the highest frequency of tooth loss with a count of 16 followed by trauma with account of 2. (TABLE 3)

According to arch wise and correlation, the highest percentage of tooth loss in both arch is due to periodontal and pulpal cause with a percentage of 41.03% and trauma with 5.13%. In lower arch the cause of tooth loss reported is due to periodontal and pulpal with a percentage of 7.69% and 2.56%. In the upper arch, the only cause reported is due to trauma with an overall percentage of 2.56%. Association between the location of the teeth and the total number of cases reported was done using Chi square test (Chi-Square value = 13.450 and p-value = .058) and found to be statistically nonsignificant. (FIGURE 3).

Tooth loss is a worldwide public health issue, especially in low and middle income countries. (Mensah et al., 2013), (Kassebaum et al., 2017), (De Marchi et al., 2012), (Peres et al., 2012). Furthermore, this condition impacts negatively on the quality of life, (Gerritsen et al., 2010) affecting daily activities like chewing, swallowing, phonation, esthetics and social life (Furuta and Yamashita, 2013). According to Marcenes and colleagues, severe teeth loss is ranked in the 36th position among the 100 chronic diseases (Seerig et al., 2015) that affect life expectancy, reflecting the importance of this condition considering not only oral, but also the systemic health (Marcenes et al., 2013). Oral health in old age can be seen as a marker of a person’s oral care history. Studies over the past decade has found a relationship between tooth loss and morbidity, in particular, (Loesche et al., 1995), (Takata et al., 2001), (Oster et al., 2003), (Joshipura et al., 2003), (Joshipura et al., 2003; Hung et al., 2004), (Hamalainen et al., 2005).

Various studies reported a relationship between tooth loss and mortality in elderly men but not in women. (Morita et al., 2006). Strong evidence from large longitudinal studies that periodontal inflammation and tooth loss are both associated with greater risk of coronary heart disease, cerebrovascular disease, and mortality (Abnet et al., 2005). Periodontal attachment loss has been identified as a significant risk factor for tooth loss. (Warren et al., 2002), confirming the role of gingival inflammation as a strong risk factor for tooth loss. (Schatzle et al., 2004).

A German study reported that periodontal disease was the most frequent cause of tooth extraction for people aged 40 and older, whereas for those younger than 40, caries and third molar extractions were the most frequent reasons. (Reich and Hiller, 1993). Linden et al. reported that age was found to be associated with tooth loss, due to the progressive loss of attachment level. (Linden et al., 2012)

The relationship between tooth loss at age 70 as an early indicator of accelerated aging and subsequent onset of disability and mortality. Anand et al. reported on extraction trends in India, caries was observed as the main etiologic factor for extraction at 44%, periodontal breakdown at 33%, Orthodontic reasons at 11%, impactions and prosthodontics purposes were at 2% (Anand, Kamath and Nair, 2010). Smoking and age were found to have a
significant effect on tooth loss; individuals that smoked had a high chance of losing teeth, and age was not related to tooth loss (Jiang et al., 2013)

CONCLUSION

From the above study it is evident that pulpal and periodontal diseases are the main cause of tooth loss. As the age increases the frequency of tooth loss is also reported high. As we know the main reasons for tooth loss are complex, involving not only physiological causes and socioeconomic causes, but also other factors like personal attitudes and beliefs. The oral hygiene should be maintained well for preventing the adverse effects in future. Further studies can be done with larger sample size correlating with the socioeconomic status and medical history in view.

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Author contributions

First author, Dr. Sai Teja Reddy collected the raw data, performed the analysis and interception and wrote the manuscript. Second author, Dr Nabeel Ahmed contributed to conception, data design, analysis interpretation and critically revised manuscripts. The third author, Dr. Keerthi Sasanka Participated in the study revised the manuscript as per guideline, alignments and formatting. All the authors have discussed the results and contributed to the final manuscript.

Conflict of interest

None Declared

REFERENCES:


CHARTS AND TABLES

TABLE 1: The table shows the association between the age of the patient to the various causes of tooth loss.

FIGURE 1: The bar diagram shows the cause of tooth loss among various age groups.

TABLE 2: The table shows the association of gender to the various causes of tooth loss.

FIGURE 2: The bar diagram shows the cause of tooth loss among males and females.

TABLE 3: The table shows the association between location of missing teeth and various causes of tooth loss.

FIGURE 3: The bar diagram shows the frequency of tooth loss according to arch wise.

<table>
<thead>
<tr>
<th>AGE</th>
<th>PULPAL CAUSE</th>
<th>PERIODONTAL CAUSE</th>
<th>TRAUMA</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 - 40</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>41 - 50</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>51 - 60</td>
<td>3</td>
<td>9</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>61 - 70</td>
<td>6</td>
<td>7</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>TOTAL</td>
<td>17</td>
<td>19</td>
<td>3</td>
<td>39</td>
</tr>
</tbody>
</table>

TABLE 1: This table shows the association of the age of the patient to the various causes of tooth loss in the tooth supported full mouth rehabilitation case. Association was done using Chi square test (Chi-Square Value = 8.559 and p-value = .638) and found to be statistically not significant.
FIGURE 1: The bar diagram shows association between the cause of tooth loss and various age groups. X axis represents the age of the patient and Y axis represents the total number of cases reported with different reasons for tooth loss: Green - periodontal cause, Blue - pulpal cause and Brown r - trauma cause. Association between the age of the patient and the total number of cases reported was done using Chi square test (Chi-Square Value =8.559 and p-value = .638) and found to be statistically not significant. Although not significant, periodontal cause of tooth loss is more in 51-60 and 61-70 age groups.
<table>
<thead>
<tr>
<th>GENDER</th>
<th>PULPAL CAUSE</th>
<th>PERIODONTAL CAUSE</th>
<th>TRAUMA</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>MALE</td>
<td>8</td>
<td>10</td>
<td>1</td>
<td>19</td>
</tr>
<tr>
<td>FEMALE</td>
<td>9</td>
<td>9</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>TOTAL</td>
<td>17</td>
<td>19</td>
<td>3</td>
<td>39</td>
</tr>
</tbody>
</table>

TABLE 2: This table shows the association of gender to the various causes of tooth loss in the tooth supported full mouth rehabilitation case. Association was done using Chi square test (Chi-Square value = .419 and p-value = .928) and found to be statistically not significant.
FIGURE 2: The bar diagram shows the association of gender to the various causes of tooth loss in the tooth supported full mouth rehabilitation case. X axis represents the gender of the patient and Y axis represents the total number of cases reported with various reasons for tooth loss as: Green - periodontal cause, Blue - pulpal cause and Brown - trauma cause. Association between the gender of the patient and the reason for tooth loss was done using Chi square test (Chi-Square value = .419 and \( p \)-value = .928) and found to be statistically not significant.

Male and Female who require full mouth rehabilitation were almost equal and there was no greater difference between men and women pertaining to tooth loss.
TABLE 3: This table shows the association between location of missing teeth in arch wise and various causes of tooth loss in the tooth supported full mouth rehabilitation case. Association was done using Chi square test (Chi-Square value = 13.450 and $p$-value = .058) and found to be statistically not significant.
FIGURE 3: The bar diagram shows association between location of missing teeth in arch wise and various causes of tooth loss in the tooth supported full mouth rehabilitation case. X axis represents the location of the teeth and Y axis represents the total number of cases reported with various reasons for tooth loss as: Green - periodontal cause, Blue - pulpal cause and Brown - trauma cause. Association between the location of the teeth and the total number of cases reported was done using Chi square test (Chi-Square value = 13.450 and p-value = .058) and found to be statistically not significant. Although not significant, more cases were reported in both arch than the other.