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Congenital and acquired tooth loss-a causative factors among children

SNEHA SREE. S[1], DR.JESSY P[2]*, DR.JAYANTH KUMAR VADIVEL[3]

[1]Saveetha Dental College, Saveetha Institute of Medical and Technical Science, Saveetha University, Chennai-600077
[2]Senior lecturer, Department of Pedodontics, Saveetha Dental College, Saveetha Institute of Medical and Technical Science Saveetha University, Chennai.-600077
[3]Reader, Department of Oral Medicine, Saveetha Dental College, Saveetha Institute of Medical and Technical Science, Saveetha University, Chennai-600077
*Corresponding Author
Email ID: 151301033@saveetha.com[1], jessyp.sdc@saveetha.com, jayanthkumar@saveetha.com

Abstract: Tooth loss can rob people of much more than the ability to chew and properly digest food. It has serious social, psychological and emotional consequences, impacting quality of life, self image and self esteem.The aim of this study is to investigate early loss of permanent teeth and its causative factors below 18 yrs old children. A retrospective study was conducted using the patient records of children visiting Saveetha dental college.The children between 6-18 years with early permanent tooth loss were selected for this study.Data including age,tooth loss and its reason was collected.The data collected were entered into SPSS version 20.0 and subjected to statistical analysis.Level of significance was set at 5% ($p<0.05$). Descriptive statistics and chi square test were applied .The results showed overall prevalence of permanent tooth loss,15.09%, dental caries was the main causative factor (31.85%) in 16-18 year old children showing statistical significant difference ($p<0.05$) and about 56.8% male predominance.It can be concluded that dental caries remains a real public health problem in developing countries. Decision makers need to focus on strategies on prevention of dental caries.

Keywords:tooth loss,cogenital

INTRODUCTION

The important goal of treating a pediatric dental patient is preserving primary or permanent teeth from getting prematurely lost, as any teeth can participate in the stimulation and development of dental arches, aid in normal occlusal relationship, maintain esthetics, help in speech development and effective mastication as well as enhance the improvement of life quality(Chen, 2002; Christabel and Gurunathan, 2015; Packiri, Gurunathan and Selvarasu, 2017).

Extraction of permanent teeth cannot be an insignificant act, especially in pedodontic patients,as it affects primary functions such as chewing, swallowing, breathing and phonation(Cahen, Frank and Turlot, 1985; Govindaraju and Gurunathan, 2017). In order to facilitate planning of dental health care services and progress strategies to continue the reduction in tooth loss, it is important to identify the factors that result in such loss(Cahen, Frank and Turlot, 1985; Nair *et al.*, 2018). Extraction of permanent teeth is carried out for several reasons, including dental caries, trauma, prosthetic indications, orthodontic treatment and tooth impaction(Nuvvula, Chava and Nuvvula, 2016).Numerous studies have been done to know the cause for early loss of permanent teeth(Gurunathan and Shanmugaavel, 2016; Govindaraju, Jeevanandan and E. M. G. Subramanian, 2017a). Dental caries is a multifactorial disease that is influenced by several characteristics such as diet, microorganisms, teeth morphology & saliva. It is also influenced by social, environmental & cultural factors. A cariogenic diet and access to dental care may be highly correlated with the occurrence of dental caries. Age, sex, education and dental health habits access to professional care can lead to a difference in the incidence of caries in different social groups(da Fonseca and Avenetti, 2017; Govindaraju, Jeevanandan and E. M. G. Subramanian, 2017b).

Dental trauma occurs frequently,it comprises 5% of all injuries for which people seek treatment. The most common injuries in permanent dentition are due to fall, followed by traffic accidents, acts of violence and sports(Jeevanandan and Govindaraju, 2018; Saraswathi and Kumar, 2018; Panchal *et al.*, 2019). Traumatic dental injuries may range from simple enamel fracture to complete tooth loss which may have a bearing on child patients and on their parents. Due to their exposed position in the dental arch, maxillary incisors are the teeth

that are most commonly affected. Incisal injury occurs more frequently in male children(Bastone, Freer and McNamara, 2000; Govindaraju, Jeevanandan and E. Subramanian, 2017; Subramanyam *et al.*, 2018).
Congenitally missing teeth or as usually called hypodontia is a highly prevalent dental anomaly. It seems that hypodontia occurs in females more than males in permanent dentition. It is not conclusive whether it tends to occur more in maxilla or mandible and also in the anterior vs. posterior segments(Rakhshan, 2015; Jeevanandan, 2017; Ravikumar, Jeevanandan and Subramanian, 2017). Environmental factors can cause tooth agenesis by a variety of means that can broadly be placed into two groups:non-invasive and invasive. These can act either addictively or independently and changes in positioning and physical development of the tooth. Jaw fractures, surgical procedures, extraction of preceding primary teeth and changes in muscle pressure are invasive and chemotherapy, nutrition deprivation and endocrine disturbances are non invasive(Pemberton, Das and Patel, 2005; Somasundaram *et al.*, 2015; 'Fluoride, Fluoridated Toothpaste Efficacy And Its Safety In Children - Review', 2018).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)
The main objective of this study is to assess the early loss of permanent teeth of patients visiting Saveetha Dental College and their causative factors in children below 18 years of age.

MATERIALS AND METHODS

This was a descriptive retrospective study of patients visiting Saveetha Dental College. Patient selection was based on records. Overall 1650 children case sheets were reviewed of patients aged 6 to 18 yrs from April 2019 to March 2020, from which, patient's records showing early loss of permanent teeth between the age group of 6-18 years were selected for this study.The patients with special health care needs ,adult patients and patients who have undergone therapeutic extraction were excluded from the study. Ethical approval was obtained from the institutional ethical committee (ethical approval number : SDC/SIHEC/2020/DIASDATA/0619-0320). The final study group consisted of 250 children out of which 140 were male and 110 were female who had missing permanent teeth.This retrospective study was conducted using the patient records of children visiting Saveetha dental college,patient's photos and case sheets were assessed, cross verification was done through telephonic and a data sheet was prepared using Microsoft Excel.The collected data were exported and analysed with SPSS version 24.0 (IBM Corporation, Chicago,USA). The quantitative variables were described in means and standard deviations and qualitative variables were described by numbers and percentages.Descriptive statistics was applied and from the results chi square test were applied at a level of significance 5% ($p<0.05$)

RESULTS AND DISCUSSION

Among 1650 children reviewed casesheets 250 patients had early permanent tooth loss, showing an overall prevalence of 15.09%.There were 108 females (43.2%) and 142 male (56.8%)[Figure-1]. The distribution of early loss of permanent teeth selected for study population 6-18 years of age [Figure-2].The association between age group and type of teeth is represented in[figure-3] which showed early permanent tooth loss was higher at the age of 16-18 years with the molars being 31.89% and incisors 31.50% proving no statistical significant difference($p>0.05$).Hence there was no significant association between the age groups and type of teeth[Table-1,figure-3] .The association between reason for permanent tooth loss and age groups is represented in[figure-4] .The highest causative factor of early loss of permanent teeth was found to be dental caries followed by trauma.Due to dental caries in the age group of 10-12 year 4.44% tooth loss was seen, and in 13-15 year olds (12.10%) and in 16-18 year olds (31.85%).The secondary reason behind tooth loss was found to be trauma in which around 8.47 % of tooth loss noticed among 13 to 15 year old and 23.39 % in 15 to 17 yr olds.The results proved that there is a significant association between reason for tooth loss and age group,$p=0.023$ which was statistically significant($p<0.05$).

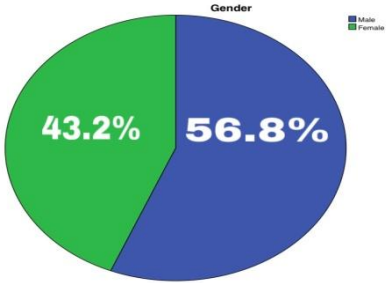

Fig.1: Pie diagram depicts the distribution of early loss of permanent teeth according to gender. Blue colour represents male and green represents female. This study shows a male prevalence (56.8%).

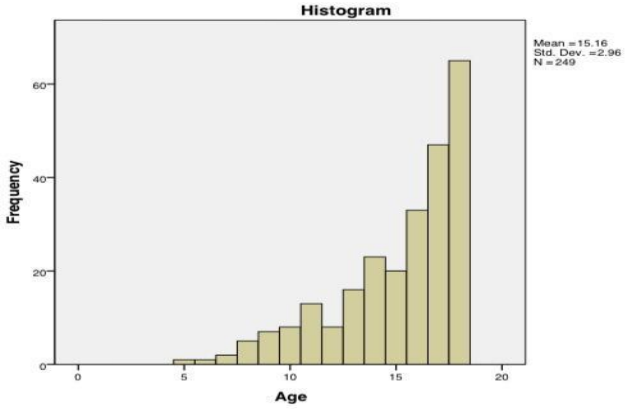

Fig.2: The Graph depicts the distribution of early loss of permanent teeth according to age groups. The x-axis represents the age of the patients and y-axis represents the percentage of participants who participated in the study.(6 to 18yrs of age)

Table1: Prevalence percentage of early permanent tooth loss among children based on age and type of teeth

Age Group	Incisor n(%)	Molar n(%)	Statistical values
10-12 years	19(7.48%)	14(5.51%)	Pearson's chi-square value= 0.701
13-15 years	30(11.81%)	30(11.81%)	df-2
16-18 years	80(31.50%)	81(31.89%)	p-value-0.70

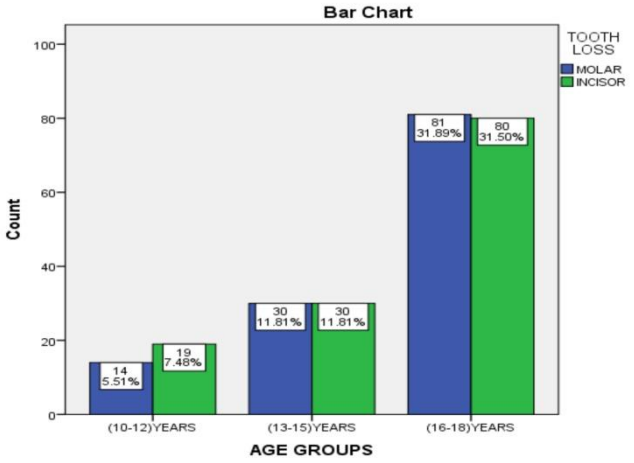

Fig.3: The bar graph representing prevalence percentage of early loss of permanent teeth by age group and type of teeth is shown in the above graph.The X-axis represents the different age groups and Y-axis represents the number of participants. The blue colour represents molars and red colour represents incisors.The prevalence of loss of molars in the age group 10-12 years was 5.51%, in 13-15 years was 11.81% and in 16-18years was31.89%. The prevalence of loss of permanent incisors in age group 10-12 years was 7.48%, in 13-15 years was 11.81% and in 16-18 years was 31.50%. Chi square test shows that there was no association between prevalence of early permanent tooth loss by age with type of teeth both molars and incisors.Comparing age group and anterior teeth the Pearson chi square value was 0.701 ;df-2;p=0.70 (p>0.05) which was not significant.

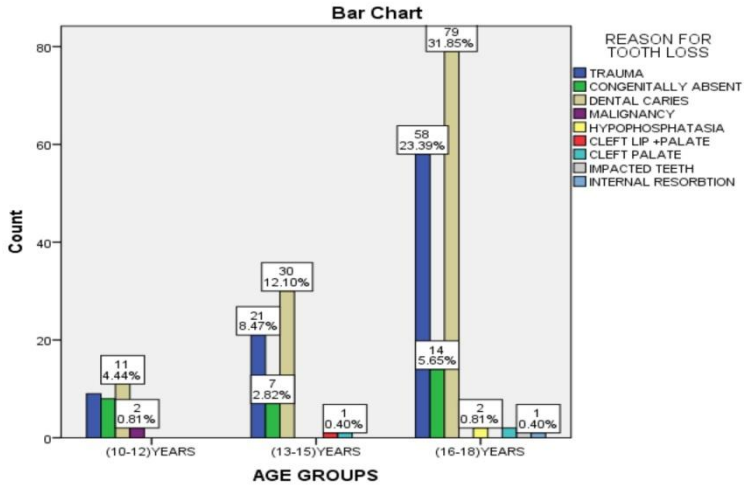

Fig.4: The bar graph representing the reasons for early permanent tooth loss based on age group. The X-axis represents the different age groups and the Y-axis represents the number of participants. The reasons for early tooth loss in 10-12 years of age was as follows : dental caries (4.44%). The reasons for early permanent tooth loss in 13-15years of age was as follows: dental caries (12.10%), trauma (8.47%), congenitally absent (2.82%) and cleft palate surgery (0.40%). The reasons for tooth extraction in 16-18 years of age was as follows : dental caries (31.85%), trauma(23.39%), congenitally absent (5.65%),hypophosphatasia (0.81%) and internal resorption(0.40%). Chi square test shows there was no association between reasons for early permanent tooth loss and age groups. Pearson's chi-square value =29.11; p=0.023(<0.05) which is significant.

Increasing the knowledge about the pattern and reasons for early tooth loss are often beneficial to a dental practitioner in order to provide better information about dental disease prevalence, dental care availability and attitude towards teeth mortality(Langdon, 1980).The main causative factor of early loss of permanent teeth was dental caries followed by trauma. Early loss of permanent teeth has been evidenced during research in many areas around the world(Haddad *et al.*, 1999). The present study proved that boys had more permanent tooth loss of about 56.8% which is in accordance to the study done by Khazaei et al who also reported a high prevalence of tooth loss in males than in females(Khazaei *et al.*, 2013).The maximum percentage of causative factor behind the early loss of permanent teeth noticed in our study was dental caries in 16-18 year olds (31.85%). Numerous studies have been conducted on the causes of loss of permanent teeth in children and adolescents and the most common cause found was dental caries.Untreated deep carious lesions may lead to either more destruction or tooth fracture. Therefore regarding this study, dental caries and its sequelae are the potential leading cause for early permanent tooth loss, which was also proved by Al-Shammari et al(Al-Shammari *et al.*, 2006) and Saheeb et al(Saheeb and Sede, 2013).

Traumatic injuries (23.39%) were found to be the second most common cause for early tooth loss in patients who were 16-18 years old and 13 to 15 yr old as per the results of the study. Harsha et al's study has shown the similar results that 39% of the children suffered from traumatic dental injuries.(Munot *et al.*, 2017) Next reason being congenital missing teeth ,the study done by Masamichi Ide et al (Ide *et al.*, 2011) observed that 11.7% of the children had congenitally missing teeth,similar results were obtained in our study.In our study, among 16 to 18 yr old ,molars (31.50%) accounted for the most commonly lost permanent teeth, Alshamrani et al study too stated that 21.3% had early loss of permanent molars(Alshamrani *et al.*, no date). Whereas in Ozmen's study only (2.66%) of the children had early loss of permanent first molars, reason being the age distribution involved in that study was different from our study(Ozmen, 2019). According to the study done by Anca et.al(Răducanu *et al.*, 2009) proved that the percentage of children and adolescents with extracted permanent molars was 5.2% which is contrary to our study, reason may be due to geographic location and different age distribution. The highest prevalence of early loss of permanent teeth noticed in our present study was in 16-18 yr olds. The reason for 16 to 18yr old permanent tooth loss in our study may be due to teeth being infected with bacteria within 10years of eruption into the oral cavity. In George et. al's study found that tooth loss increases with age (George *et al.*, 2011).Silva et.al proved that higher incidence of tooth loss in adults (Silva-Junior, Batista and de Sousa, 2017).

Due to the deleterious effect of early loss permanent teeth,it becomes mandatory to increase the oral health awareness by conducting school dental health programs,making the children and their parents realize the deleterious effect caused by early loss of permanent teeth.Thus the clear knowledge about the importance of

permanent teeth to be instilled among parents and children so that they do not ignore in paying attention.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; Vijayashree Priyadharsini, Smiline Girija and Paramasivam, 2018; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Ramadurai *et al.*, 2019; Sridharan *et al.*, 2019; Vijayashree Priyadharsini, 2019; Chandrasekar *et al.*, 2020; Mathew *et al.*, 2020; R *et al.*, 2020; Samuel, 2021)

CONCLUSION

Within the limits of the present study, the following conclusion could be drawn:
Early permanent tooth loss was higher among 16 to 18 yrs old children, with male predominance of 56.8% The highest causative factor of early loss of permanent teeth was dental caries followed by trauma. In 10-12 years (4.44%), in 13-15 year olds it was (12.10%) and in 16-18 year olds it was (31.85%).Dental caries with its pulpal pathologies were found to be the most common cause for loss of permanent teeth. So vigilance is required when dealing with dental caries in children. Dental programs should discuss the importance of permanent teeth and its preventive measures.

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