Analysis on frequency of missing mandibular first molar in medium aged adults – A Retrospective study

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Abstract: The retrospective study was conducted among patients visiting the out patient department of a private hospital, Chennai. The aim of the study was to identify the frequency of missing mandibular first molars in medium aged adults. Patients belonging to age group 35 to 75 years with missing mandibular first molar and patients who underwent extraction of mandibular first molar from June 2019 to March 2020 were selected for the study . The patients undergoing replacement of the missing teeth were also evaluated. The data was entered into the SPSS software by IBM and analyzed by descriptive analysis and Pearson correlation. The study population consisted of 1099 patients with missing or extracted mandibular first molar within the age group 35 to 75 years. We observed that the frequency of missing mandibular first molar is 12% among the medium aged adult population with missing teeth. Maximum number of patients with missing mandibular first molar belonged to the age group 35 to 45 years (66.33%) [p value = 0.002 - significant]. Around 50.05% of the study population did not undergo any replacement procedure and 49.95% underwent prosthodontic treatment for replacement of the missing mandibular first molar teeth .Out of which 23% underwent implant , 20.1% underwent TPD, 7% underwent Fixed dental prosthesis . The remaining 47.4% of the population did not undergo treatment of missing / extracted teeth .

Keywords: mandibular , molar , prevalence , treatment , implant , fixed dental prosthesis.

INTRODUCTION

The first permanent mandibular molar functions as the key of occlusion. It bears the maximum occlusal load. It influences the vertical distance of the maxilla and mandible. It produces occlusal height and functions in aesthetic proportions (Rezaie, Ghapanchi and Haghnegahdar, 2018). The most important role of being the primary masticator unit in the dental arch is played by the first permanent molar. It is more effective in showing food than any other teeth in human dentition as its base is wide (occlusal surface), which plays a pivotal role. It forms the core in favourable occlusion (Moghaddas and Moozeh, 1995).

The first permanent tooth to erupt is the mandibular first molar at the age of 6 to 7, plays a numerous dominant role in eruption of other permanent teeth and maintaining occlusion (Çolak, Dülgergil and Dalli, 2013). It also helps to maintain facial height , facial growth (Major and Stanely, 1987). Loss of permanent molars, because of dental caries , negatively affects both arches and has adverse effects in occlusion. It is reported that early extraction of those teeth results in tilting of neighbouring teeth to hollow spaces , supra eruption of teeth in opposite arch ,unilateral chewing , shift in midline and dental malocclusion (Ebrahimi and Behjat-Al-Molook Ajami, 2010). Dental arch instability caused by a missing posterior tooth is related to the tooth location, occlusion, and other variables. Drifting, tipping, rotation, supra-eruption, and segmental alveolar bone growth are potential detrimental effects associated with unrestored tooth loss. Each of these negative possibilities varies in the likelihood and extent of change anticipated (Love and Adams, 1971). Current evidence suggests that these changes are not as frequent or extensive as historically believed. These potential detrimental effects should be understood and explained to the patient. If intervention is not provided, conventional casts or digital replication of existing conditions for future comparisons is advised (Rivers and Richardson, 1982).

The first permanent mandibular molar has been quoted as being the most caries prone tooth in the permanent dentition , probably as a result of its early exposure to the oral environment (Gill, Lee and Tredwin, 2001). During the period of eruption, the permanent first mandibular molar is the last tooth in the oral cavity and the

accessibility and dexterity for maintaining the oral hygiene is difficult. Moreover the deep pits and fissure nature of the tooth makes it more prone for food lodgement, which in turn leads to dental caries. The negligence towards the treatment of dental caries in the initial stage of dental caries and lack of awareness of retaining it after symptomatic pulp involvement leads to the loss of the tooth (Çağlaroğlu, Kilic and Erdem, 2008; Artun and Thalib, 2011). The Decision to extract permanent teeth must be reasoned and integrated into a global treatment plan that often requires collaboration with other dental specialties. The analysis of the causes of permanent tooth loss is of interest to practitioners and decision makers in order to develop control strategies to be integrated into overall dental public health programs. It is from this perspective that an indirect method based on the prevalence of these tooth loss, Is used in many countries. Numerous studies, on the cause of permanent teeth extraction in children and adults have been conducted in industrialized countries and caries and periodontal problems have been the main cause (Morita, Kimura and Kanegae, 1994; Angelillo, Nobile and Pavia, 1996). 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)

MATERIALS AND METHOD
The retrospective study was conducted among patients visiting the out patient department of a private hospital, Chennai. The patients belonging to the age group 35 to 75 years ,with missing or extracted mandibular first molars were included in the study and the treatment modalities undertaken by the patient were recorded. The retrospective evaluation was conducted using data provided by the Hospital. From 86000 patients reported in the outpatient department in the private hospital between June 2019 and march 2020, the data was collected and analyzed. To minimize sampling bias, inclusion of all available Data with exclusion of incomplete data was done. Internal and external validity of data is present. The data was entered in a methodical manner [serial number, name, age, gender, tooth number]. The data was entered into Microsoft Excel and tabulated. Following which data was imported into the SPSS software by IBM. Data analysis was performed in the statistical software SPSS and data was analyzed by descriptive Analysis and Pearson correlation.

RESULT
The study population consisted of 1099 patients with missing or extracted mandibular first molar within the age group 35 to 75 years. In this study we observed that the frequency of missing mandibular first molar is 12% among the medium aged adult population.
The study population was distributed into the age groups 35 to 45 years,46 to 50 years, 51 to 70 years , among the middle age population. Maximum number of patients with missing mandibular first molar belonged to the age group 35 to 45 years (66.33%). Based on evaluation of gender , females (50.86%) presented with more number of missing mandibular first molars , compared to males (49.14%).
The association between age and gender of the study population was done using chi square test.
[p value = 0.002 - significant]. The males (30.66%) and females (35.67%) belonging to the age group 35 to 45 years had the highest number of missing mandibular first molars, whereas the males (2.27%) and females (0.82%) of the age group 51 to 70 years presented with the minimum number of missing mandibular first molars. This result is statistically significant. Hence, there is significant association between age and gender of the patients with missing mandibular first molar.
The study population was further divided based on the treatment status of the missing tooth . Around 50.05% of the study population did not undergo any replacement procedure and 49.95% underwent prosthodontic treatment for replacement of the missing mandibular first molar teeth .The association between treatment status and age was done using chi square test. [p value = 0.272 - significant]. Among the patients who underwent treatment, the most number of patients belonged to the age group 35 to 45 years (27.39%) and among the patients who did not undergo treatment , the most number of patients belonged to the age group 35 to 45 years (38.94%). However , this is statistically insignificant . Hence ,there is no significant association between treatment status and age of the patients with missing mandibular first molar.
The association between treatment status and gender was done using chi square test. [p value = 0.033 - significant]. Among the patients who underwent treatment, the female population (26.84%) were more than the male population (23.11%). And among the patients who did not undergo any treatment for the missing teeth , the male population (26.02%) were more than the female population (24.02%). This result is statistically significant. Hence , there is no significant association between treatment status and gender of the patients with missing mandibular first molar.

The various types of treatments undergone by the patient for replacement of missing mandibular first molar was evaluated. Around 49.95% underwent prosthodontic treatment for replacement Out of which 23% underwent implant , 20.1% underwent TPD, 7% underwent Fixed dental prosthesis . The remaining 50.05% of the population did not undergo treatment of missing / extracted teeth .
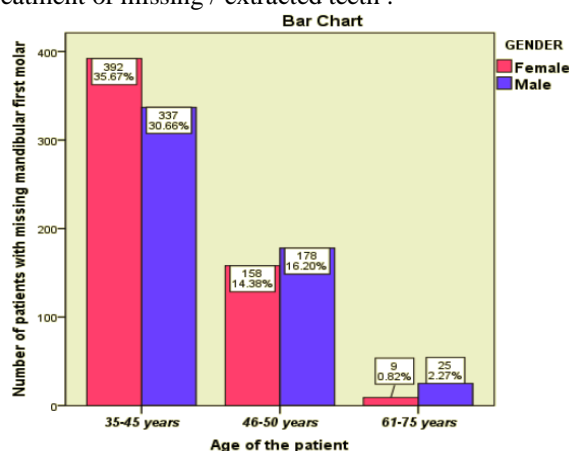

Fig.1: Bar chart showing association between age and gender of patients with missing mandibular first molar teeth. X axis denotes the age distribution of patients with missing mandibular first molar teeth and the Y axis denotes number of patients with missing mandibular first molar teeth. Among the patients belonging to the age group 35-45 years, the female population (pink)(36.67%) presented with the maximum number of missing mandibular first molar teeth, followed by the male population (blue) (30.67%) belonging to the same age group. The least number of missing teeth was presented by the female population of age group 61 to 75 years (0.82%). (Chi square test ; p value = 0.002 - significant). Hence, there is significant association between age and gender of patients with missing mandibular first molar teeth.
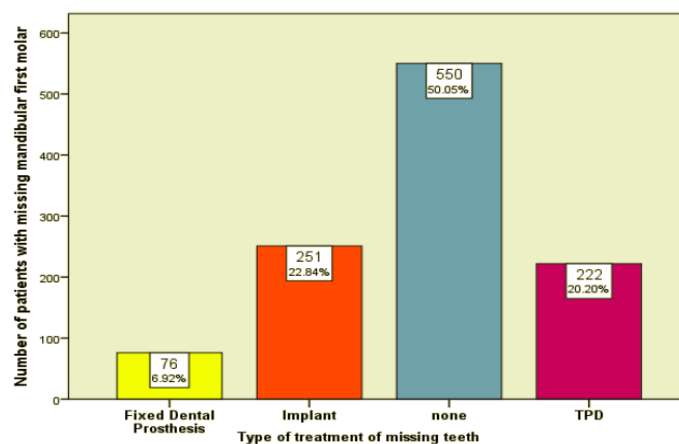

Fig.2: Bar chart representing the distribution of various types of prosthodontic treatment undergone by the patients with missing mandibular first molar teeth. X axis denotes the various types of prosthodontic treatment undergone by the patients with missing mandibular first molar teeth and the Y axis denotes number of patients with missing mandibular first molar teeth. Around 50.05% of the study population did not undergo any replacement (blue) procedure and 49.95% underwent prosthodontic treatment for replacement of the missing mandibular first molar teeth. The most common type of prosthodontic treatment undergone by the patients is implant (orange) (22.84%) , followed by the Temporary partial denture [purple] (20.20%) and the least being Fixed dental prosthesis (yellow)(6.92%).
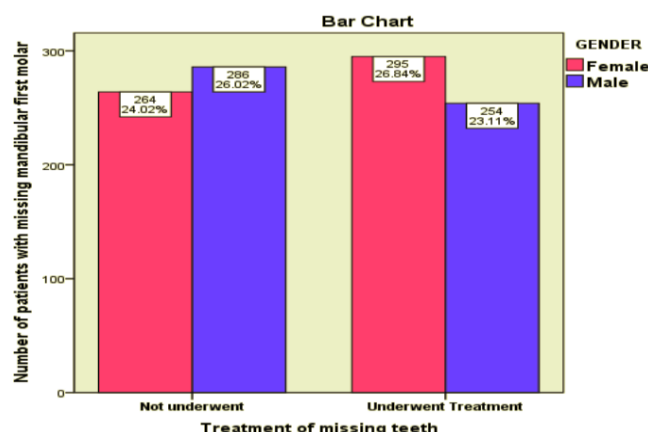
Fig.3: Bar chart showing association between treatment status and gender of patients with missing mandibular first molar teeth. X axis denotes distribution of patients according to the treatment status of the missing mandibular first molar teeth and the Y axis denotes number of patients with missing mandibular first molar teeth. Among the patients who underwent treatment, the female population (pink) (26.84%) were more than the male population (blue)(23.11%). And among the patients who did not undergo any treatment for the missing teeth , the male population (26.02%) were more than the female population (24.02%). (Chi square test ; p value = 0.033 - insignificant). Hence, there is no significant association between treatment status and gender of patients with missing mandibular first molar teeth.
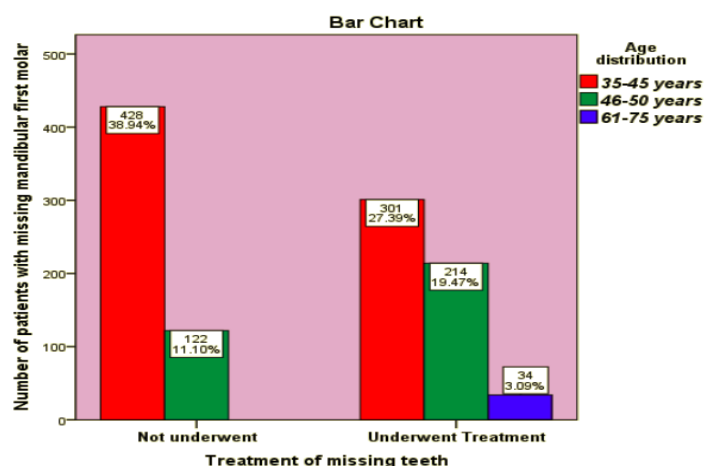

Fig.4: Bar chart showing association between age and treatment status of patients with missing mandibular first molar teeth. X axis denotes whether the patients underwent treatment or not, among patients with missing mandibular first molar teeth and the Y axis denotes number of patients with missing mandibular first molar teeth. Among the patients who underwent treatment, the most number of patients belonged to the age group 35 to 45 years (27.39%) and among the patients who did not undergo treatment , the most number of patients belonged to the age group 35 to 45 years (38.94%). (Chi square test ; p value = 0.271 - insignificant). Hence, there is no significant association between treatment status and age of patients with missing mandibular first molar teeth.

DISCUSSION

The prevalence of missing mandibular first molar is 12 % among the medium aged population of the current study. Missing mandibular first molars were seen in 33.5% of the subjects, this is according to a retrospective study by Mostafa et al among permanent first molars in a group of Iranian children and adults (Rezaie, Ghapanchi and Haghnegahdar, 2018). This is in agreement to the findings of the current study and there is no previous literature with opposing findings. The prevalence of missing mandibular first molar was greater among the female population (51%) compared to the males of the study population. However , a study by Khagia et al the results prove contrary to current findings by saying that the tooth loss is more developed among the male population compared to female population of Iranian adults (Khazaei *et al.*, 2013). The prevalence of missing mandibular first permanent molar teeth was greater among the age group of 35 to 45 years in the middle age population, compared to the other age groups. This finding is an agreement to the study performed by Mostafa

et al (Rezaie, Ghapanchi and Haghnegahdar, 2018) among Iranian adults stating that 34 % among the 40 to 60 year old adults had the most number of extracted mandibular first permanent molars. A study by Safadi et al in subjects age 13 to 20 years showed that the prevalence of extractions of permanent mandibular first molar was 31.3 % (Dieng *et al.*, 2016). Previously our team had conducted numerous clinical trials (Ashok, Nallaswamy and Begum, 2014; Ganapathy and Sathyamoorthy, 2016; Vijayalakshmi and Ganapathy, 2016; Jyothi, Robin and Ganapathy, 2017; Jain *et al.*, 2018; Kannan and Venugopalan, 2018; Duraisamy and Krishnan, 2019) analysed reviews (Selvan and Ganapathy, 2016; Subasree and Murthykumar, 2016; Kannan, 2017), in-vitro trials (Ranganathan and Ganapathy, 2017) and few epidemiological studies (Ashok and Suvitha, 2016; Basha and Ganapathy, 2018) over the past 5 years. Now we are focussing on epidemiological surveys.

About 52.6% of the study population underwent treatment of missing/ extracted teeth. Out of which 23% underwent implant , 20.1% underwent TPD, 7% underwent Fixed dental prosthesis. The remaining 47.4% of the population did not undergo treatment of missing / extracted teeth. The replacement of a single molar with 1 implant has been shown to be an effective treatment modality in short-term studies. However, this presents a biomechanical challenge (Schmitt and Zarb, 1993). Restorative options also need to be clearly explained to the patient. A tooth-supported fixed dental prosthesis (FDP) improves esthetics and function, stabilizes tooth position, and reduces potential alveolar stresses . Implants with crowns are initially expensive but may be less costly and have more predicted longevity than conventional FDPs (Hood, Farah and Craig, 1975).

In summary, treatment options may range from no treatment, a resin partial removable denture prosthesis (RDP), and various tooth-borne FDPs to an implant-supported fixed restoration. There is information dentists need to know and patients need to be told and understand that is important for proper care. Thus proving that is great susceptibility of the permanent first molars to be extracted . The economic situation and/or a lifestyle that is not compatible with preventive conscious approach, lack of dental facilities, lack of financial resources or lack of information and education on oral health may create a barrier to systematic visits or consultations as soon as the first signs of dental issues arise (Dieng *et al.*, 2016). The mandibular first molar is more prone to loss when compared to maxilla due to its position and the presence of parotid duct in close proximity. The patient's values coupled with short and long-term outcomes based on best available evidence, need for lifelong maintenance, and fiscal realities should be evaluated carefully with the patient when considering posterior tooth replacement.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)

CONCLUSION
In this study we observed that the frequency of missing mandibular first molar is 12% among the medium aged adult population with missing teeth. Maximum number of patients with missing mandibular first molar belonged to the age group 35 to 45 years (66.33%). Around 50.05% of the study population did not undergo any replacement procedure and 49.95% underwent prosthodontic treatment for replacement of the missing mandibular first molar teeth. Hence the need for oral health education and awareness is very crucial among the Indian population to prevent further loss of teeth. This cross-sectional retrospective study is not an exact indicator of first permanent mandibular molar missing teeth, however father retrospective and prospective studies on larger populations and limited age ranges are needed to provide an accurate estimate of the number of missing first molars in the south Indian population.

ACKNOWLEDGEMENT

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