# PREVALENCE OF MISSING PERMANENT FIRST MOLARS IN PATIENTS SEEKING ORTHODONTIC TREATMENT.

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**ABSTRACT:**

The aim of this study was to assess the prevalence of missing permanent first molars in the South Indian population who reported for orthodontic treatment to a dental hospital. A total of 550 OPGs of patients who reported for orthodontic treatment to the hospital were assessed for missing permanent first molars.The data was retrieved from the extensive electronic database record of the hospital. Descriptive analysis was done to represent the data. Prevalence of missing permanent first molars was found to be 5.8%. A significant percentage of the orthodontic population have missing permanent first molars. A thorough clinical examination, from an orthodontic perspective will help formulate a better treatment plan.

**KEY WORDS**:Missing First Permanent Molars, Orthodontic Patients,Prevalence.

**INTRODUCTION:**

First permanent molars are the first permanent teeth to erupt in the oral cavity by the age of six years (Kumaraswamy, 2014; Research and Case Medical Research, 2020) .They play a crucial role in development of occlusion, arch development and normal oral functions.(Salzmann, 1943)

The morphology of these teeth includes a broader mesio-distal dimension, a broad contact area, deeper embrasures as seen coronally(Mathur and Mathur, 2008; Ferreira *et al.*, 2020). As we go radically, they are multi rooted teeth with 2-3 roots usually and may have even more in a few exceptional cases. The occlusal topography is of concern here, with deeper and complex pits, grooves and fissures, the susceptibility to caries also increases. A poor oral hygiene, frequent intake of sugary diet, ignorance of dental health by the child and the parents, eventually ends up with the parents reporting associated pain with these teeth or gross caries which ultimately require extraction.(Tunc and Koc, 2020;National Research Council (U.S.). Committee on Dental Health, 1952; Fejerskov and Kidd, 2009)

Apart from other oral functions, first molars play an important role in Orthodontics. Its importance dates back to 1899 when Edward H. Angle classified malocclusion on the basis of relation of upper to lower permanent first molars(Peck, 2009). Another important feature of molars comes in orthodontic cases

with extraction protocol. In extraction cases anchorage is a very important consideration. Permanent molars form the basis of anchorage in orthodontics. Greater the surface area of the tooth better the anchor unit and enhanced anchorage.

A missing permanent first molar leads to alteration in treatment plans and treatment mechanics more so in usual cases as well. When the loss is asymmetric changes occur in antero-posterior as well as vertical dimension. In case of asymmetric loss, inta -arch alterations like: midline shift, alteration of canine relation and altered canine guidance occur(Arvinth *et al.*, 2016). Inter-arch changes will be: supra-eruption of antagonist teeth, premature contact, deviated path of jaw opening and closure and TMJ issues(R and Julia, 2017).

Thus, it becomes essential for an orthodontist to be familiar with the incidence of missing permanent molars in order to combat the problems associated. This study was therefore undertaken to assess the prevalence of missing permanent first molars in the South Indian population.

## Materials And Methods
This retrospective study was conducted in the Department of Orthodontics , Saveetha Dental College and Hospital.

## Patient Selection:
The pretreatment orthopantomogramme of all patients who reported between June 2019 and March 2020, to the department for orthodontic correction were included in the study. A sample size of 550 was calculated using G*power software, based on calculation from previous study (Safadi *et al.*, 2018). The teeth assessed were: permanent maxillary and mandibular first molars.

## Inclusion Criteria:
Patients above 12 years of age (marking the eruption of all permanent teeth in upper and lower arch)
Both non-syndromic and syndromic patients were included because the aim was to assess overall prevalence.

## Exclusion Criteria:
Patients younger than 12 years.

## Data Collection:
The data extraction was done from the online electronic database software of the hospital. This database stores every information pertaining to history, general examination, required treatment, patient consent, treatment details and all radiographic records of nearly 86000 patients in the mentioned period. This database was reviewed based on inclusion criteria and dental history and clinical status of each eligible patient was obtained and tabulated. OPGs were individually downloaded from each patient's radiographic record

## Data Assessment:
After data collection was complete, all details of each and every patient was tabulated, OPGs were assessed and if any first permanent molar was missing, a cross evaluation was done by checking through clinical data. The reason for missing molar was evaluated from the patient's dental history record. All the data was tabulated. Once data collection was through, the data was analyzed using IBM SPSS Statistics Software-Version 23. Descriptive Analysis was used to report the prevalence of missing

permanent first molars .Chi-square test was done to establish association amongst missing first molar and gender of patient.

**RESULT AND DISCUSSION:**

In the present study the prevalence of missing permanent first molars was found to be 5.8% (Figure-1). 32 out of 550 patients OPG revealed one/two/three/or all four permanent first molars missing. In terms of individual teeth, the highest prevalence of missing right mandibular first molars was 38.89%, and for maxillary left first molars it was 27.8%.Maxillary right first molar and Mandibular left first molars were missing in 16.7% of orthodontic population respectively(Figure-2). Males had significantly higher prevalence of missing first molars than females(p-value > 0.05)(Figure-3).Since males have higher prevalence of missing permanent molars there should be more focus in increasing awareness  among males to maintain their oral hygiene, to prevent early loss of permanent teeth.

The results of the current study indicates that the 5.8% orthodontic population may have at least one missing permanent first molar. At least 7 patients had all four first molars missing .In a similar study, the prevalence of missing molars was found to be 5.2% in the general population.(Safadi *et al.*, 2018)

Mandibular first molars were found to be missing with a frequency twice as much as maxillary first molars. The cause of this can be attributed to the time of eruption of mandibular first molars and their anatomy(Ferreira *et al.*, 2020). These are the first permanent teeth to erupt, disposing themselves to exposure to oral fluid and environment for a longer time than other teeth(Ricucci, Gröndahl and Bergenholtz, 2000). Broad contact areas and occlusal characteristics can also be a predisposing factor for their carious involvement.(Goose and Brayshaw, 1972; Chen *et al.*, 2020)

The available previous literature on missing permanent molars focuses on endodontic importance, however, permanent first molars are very essential even from an orthodontic point of view.

From an orthodontic perspective a missing permanent first molar can present challenges in treatment planning. A vertical drift and a horizontal drift can result which can lead to trauma from occlusion, occlusal decalibration, arch length reduction, crowding, ectopic eruption of adjacent permanent teeth, tipping of second molar and premolars in the space created by loss of permanent first molar and if no replacement or space closure is planned, alveolar bone loss will be ultimate sequelae.(Kau *et al.*, 2003; Llena *et al.*, 2020)

A careful diagnosis is the key to successful orthodontic treatment. To be aware about the associated orthodontic sequela of first molar loss will help us to build a better treatment plan. In cases where molars are missing, a thorough diagnosis to check for: Any premature contact points, functional shift and midline shift must be checked more precisely. Anchorage planning will be an important factor. Depending upon whether the extraction space is available or the adjacent tooth has tipped or has completely occupied the space, treatment plan will alter. In case the space is intact, maintenance of space orthodontically to prevent loss in arch length is important. Situations where adjacent teeth have tipped into the extraction space, decision to open or close the spaces will be important. Molar uprighting to gain space and attain root parallelism becomes a primary mechanics to be considered. In a situation where second molars have occupied the space completely, second molars are treated as first molars and treatment plan is made accordingly.

Previously our team had conducted numerous clinical trials (Kamisetty *et al.*, 2015; Krishnan, Pandian and Kumar S, 2015; Viswanath *et al.*, 2015; Sivamurthy and Sundari, 2016; Samantha *et al.*, 2017; Vikram *et al.*, 2017)(Felicita and Sumathi Felicita, 2017) and lab animal studies (Kumar *et al.*, 2011; Jain, 2014; Rubika, Sumathi Felicita and Sivambiga, 2015; Felicita, 2017; Pandian, Krishnan and Kumar, 2018) and in-vitro(Felicita, Shantha Sundari and Chandrasekar, 2012; Dinesh *et al.*, 2013; Felicita and Sumathi Felicita, 2018) studies over the past many years. Now we are focusing on epidemiological studies .The idea for this study stemmed from the current interest in our community.

Limitations of this study are that the timing of extraction will influence the severity of problems. Timing of extraction however was not considered in the current study and thus a future study to investigate the same can be done.

**CONCLUSION:**
5.8% of orthodontic patients had missing permanent first molars. Mandibular first permanent molars are commonly the teeth that are missing due to a variety of causes. A thorough clinical examination, from an orthodontic perspective will help formulate a better treatment plan.

**AUTHOR CONTRIBUTIONS:**
This research study was done by combined efforts of all authors.

**CONFLICT OF INTEREST:**
There is no conflict of interest .

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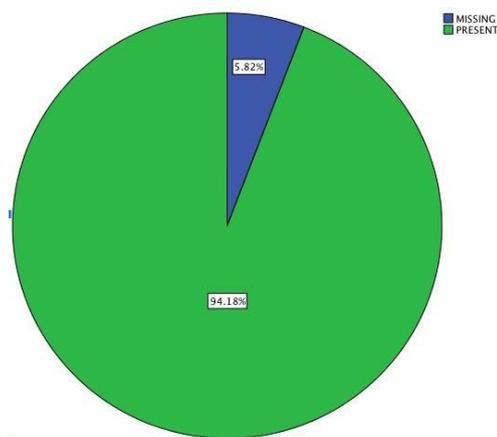
FIGURE 1: Pie -Chart representing percentage distribution of missing permanent first molars in Orthodontic Patients.Blue colour denotes patients with missing first molars and green colour

denotes the population with all permanent first molars in arch. 5.8% of the orthodontic patients did not have First Permanent Molar in at least one quadrant.
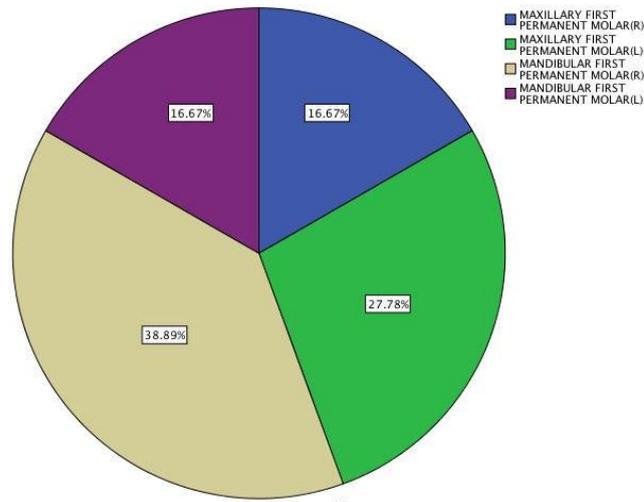


FIGURE 2: The Pie-Chart shows that frequency distribution of each permanent first molar . Mandibular right first permanent molar denoted in beige colour was missing in 38.89% of patients seeking orthodontic treatment. 27.78% of orthodontic patients had missing permanent left maxillary molar which is denoted in green colour. Mandibular left first permanent molar(purple) and maxillary right permanent molar(blue) were missing in 16.67% of the orthodontic patients respectively.
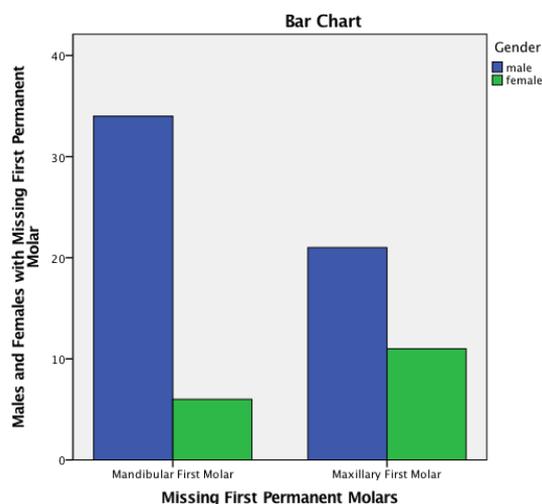


FIGURE 3: The Bar Chart shows gender comparison in orthodontic population with missing Maxillary And Mandibular first molars. X-Axis represents missing first molars in maxilla and mandible,Y-Axis represents number of males and females with missing first molars. Blue colour denotes male and green colour denotes female. Males had a significantly higher prevalence of missing permanent molars. (Chi - Square; p-value =0.05-Significant)

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