

Prevalence of mesial step malocclusion in mixed dentition

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Abstract: If a child has a flush terminal plane molar relationship early in the mixed dentition, about 3.5 mm of movement of the lower molar forward relative to the upper molar is required for a smooth transition to a Class I molar relationship in the permanent dentition. About half of this distance must be supplied by differential growth of the lower jaw, carrying the lower molar with it. The other half can be obtained from the leeway space, which allows greater mesial movement of the mandibular than the maxillary molar. The aim of this study is to determine the prevalence of distal step malocclusion in mixed dentition in a private dental institute. A study was carried out by collecting data by reviewing patients data and analysing the data of 86000 patients between June 2019 and March 2020 at the private dental institute. The sample size that was taken included 4420 number of children with mixed dentition aged 6-12 years old, who came to the private dental institute for consultation. The dental malocclusion status was analysed and recorded. Data of children that had distal step malocclusion were segregated and analysed with gender and age distribution. Data was statistically analysed using SPSS 2.0 (IBM 2019) PC Version for Windows, Chi-Test was conducted. Result was recorded. Out of 4420 patients, 395 patients had distal step malocclusion. The study revealed that the prevalence of distal step malocclusion in a private dental institute was only 8.9%, predominantly male patients. About 395 had distal step malocclusion which included 211(53%) were male patients and female patients were 184(47%). Statistically, the association of age and gender among patients with distal step malocclusion was not significant ($p>0.05$), [Pearson Chi Square Test Value= 5.394; $df= 6$; p value= 0.494 (> 0.05)]. As a conclusion, the prevalence of distal step malocclusion in mixed dentition in the private dental institute was found to be 8.9%.

Keywords: distal, Gender, Mixed dentition, Prevalence study, School Age Population

INTRODUCTION

Maintenance of oral health in the deciduous stage is significant as an individual moves from primary to mixed and permanent dentition. As an orthodontist, the main objective would be to decide whether preventive, interceptive, or corrective treatment is required. Molar relationship in a mixed dentition can be classified into mesial step, distal step or flush terminal plane. Flush terminal plane refers to when the distal surfaces of the upper and lower second primary molars were in the same vertical plane in centric occlusion. Distal step refers to the type of malocclusion where the distal surface of the mandibular deciduous second molar is distal to that of the maxillary deciduous second molar. Lastly, mesial step relation can be explained as distal surface of lower second deciduous molar is more mesial than that of upper deciduous molar. This type of terminal plane is generally caused due to early forward growth of mandible.

Previous cohort studies have indicated that malocclusion in primary dentition leads to malocclusion in permanent dentition. According to a study by Lu Shen, Fang He, Cai Zhang, Haofeng Jiang & Jinhua Wang, the second most common terminal plane is mesial step at 43.24%. Similar study done in India also showed mesial step was at second highest of the population (12.8%).

This study aims to bring about the importance of spontaneous correction of the malocclusion at an earliest stage. There was a consensus that the distal surfaces on the second deciduous molars, i.e., the primary molar relationship in the deciduous dentition, predicted the identification of the permanent molar relationship. I hope this study encourages more researchers to further evaluate the correlation amongst the occlusion.

MATERIAL AND METHODS

Study population:

This was a retrospective study carried out from records of patients with mixed dentition who visited Saveetha Dental College. It was a university based study setting. The data was collected by analyzing the records of 86000 patients between June 2019-March 2020. Records of 6 to 12 year old patients in their mixed dentition who had completely erupted upper and lower first permanent molars were included in our study. Records of patients with malformed or grossly deformed or extracted permanent first molars were excluded from the study. The collected data includes the patient's age, gender and molar relation according to Angle's classification.³² Patient's records which were incomplete were excluded from the study. The data collected were cross verified with intraoral photographs and randomly selected records were verified by the second examiner. Patients with mesial step relation were segregated and the data was tabulated separately.

Sample size:

Sample size is the total number of patients who visited Saveetha Dental College in their mixed dentition between 6-12 years old with distal step relation. Their distribution according to age, gender, and malocclusion were recorded.

Ethical approval:

Ethical clearance was obtained from the Institutional Ethical Committee and Scientific Review Board [SRB] of Saveetha Dental College.SDC/SIHEC/2020/DIASDATA/0619-0320

Data analysis:

The data collected were entered and subjected to statistical analysis using SPSS software. Descriptive statistics was done to find the prevalence of distal step molar relation. The data was further stratified based on the age and gender. Independent variables were age and gender while dependent variable was the molar relationship. Chi square test was done to look for any association between the age and gender in the study population. The level of significance was kept at $p < 0.05$.

RESULTS AND DISCUSSION

A total of 4420 patients with mixed dentition, aged between 6-12 years old visited our hospital out of which 395 patients (8.9%) had mesial step occlusion [Figure 1]. In patients with mesial step, about 211 patients were male (53.42%) and 184 patients were female (46.58%) [Figure 2].

The majority of patients with mesial step, 11 year olds had the least number of class III occlusion (11.39%). The age distribution also showed that 7 year olds had 57 patients (14.43%), 8 year olds had 56 patients (14.18%), 9 year olds had 50 patients (13.16%), and finally 12 years olds had 58 patients (14.94%) [Figure 3].

The males had more mesial step occlusion compared to female patients in the age group of 6 years old. However, Chi square test showed the association between gender and age distribution among patients with class III malocclusion showed no significant difference as the p value was more than 0.05 (p value = 0.494). Implying no association between age and gender of patients with mesial step occlusion in mixed dentition.

This research aimed to find out the prevalence of class III malocclusion in children with mixed dentitions, aged between 6-12 years old who visited a private dental college, in Chennai. Out of 4420 patients with mixed dentition, only 8.9% patients had mesial step malocclusion. The gender distribution showed 46.58% were female and 53.42% were males. Among the age group of 6-12 years old, the highest number of patients with mesial step malocclusion were seen in the 6 year old group.

The study done among Nigerian population on 11-18 year old children had reported the prevalence of mesial step to be 2%³⁹. Studies done among the European population on 7-15 year old school children had reported the prevalence of distal step to be from 3.2%³⁵ and 5.21%.³⁶ Studies done among American population in 8-12 year old school children had reported a prevalence of 10%³⁷ and 9.1%³⁸ distal step malocclusion. In our study, about 8.9% had reported with mesial step malocclusion, which was higher than prevalence in Nigerian and European populations but similar to the prevalence seen in the American populations.

The high prevalence of mesial step prevalence in our study was due to the different study settings. Present study was conducted in a dental hospital set up and hence the prevalence of malocclusion could have been higher when compared to the general population. Whereas, previous studies were based on a school setting.

This study was based on data from a single university hospital based center, which could be argued as a limitation but this type of a setting has helped us to achieve higher sample size with high internal validity which enabled us to provide better results. It would

be interesting to do a multi centered study based on school children in the future and to compare the results of the study with our results.

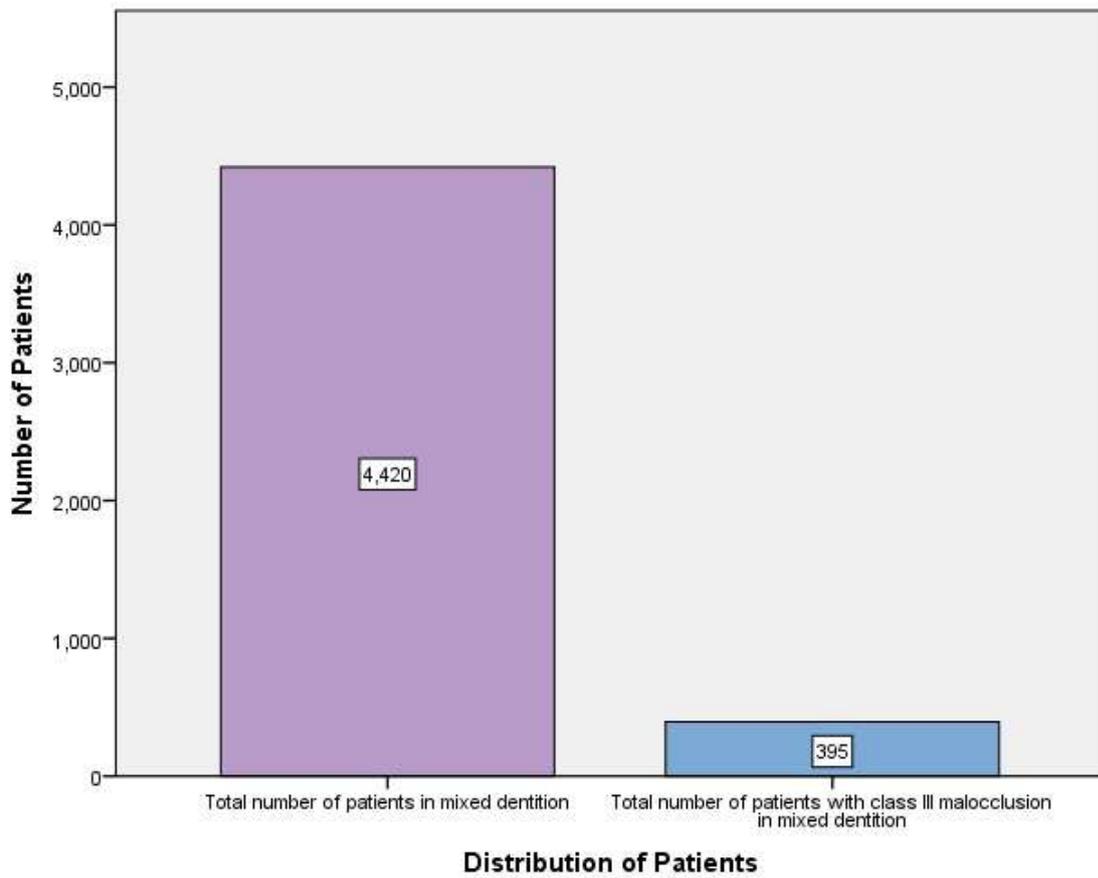


Figure 1: The bar graph shows the total number of patients with mixed dentition and number of mesial step malocclusion patients with mixed dentition reported to the private dental institute.



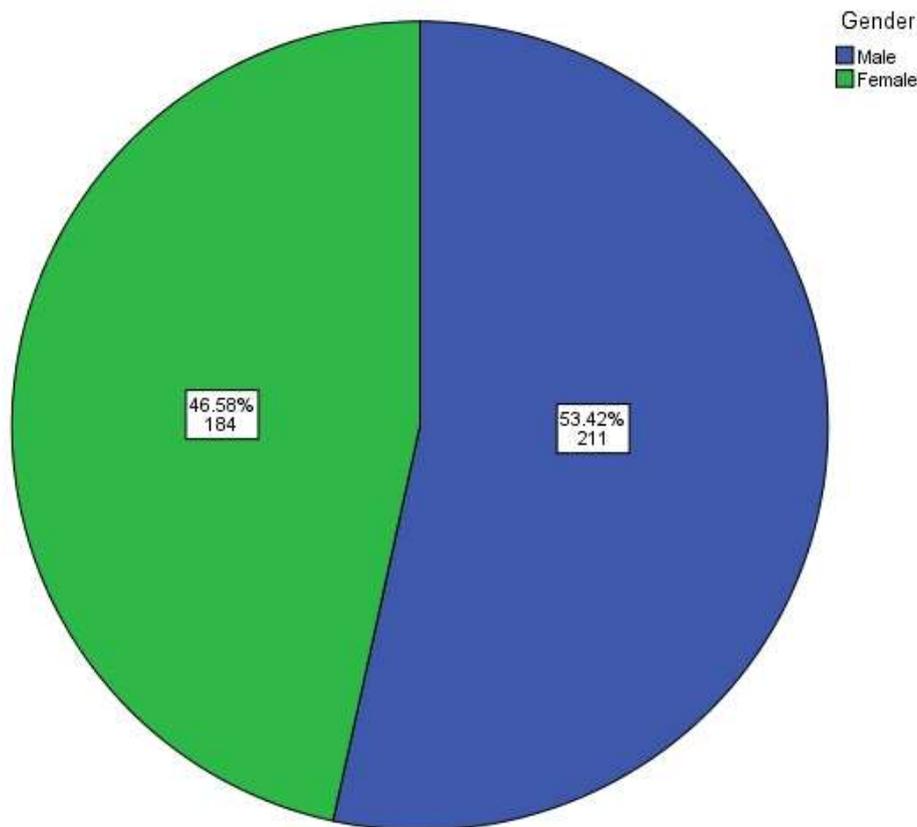


Figure 2: Pie chart showing the distribution of distal step population based on gender. It shows that more number of males (blue) had mesial step relation occlusion when compared to females (green).

CONCLUSION

To conclude, the prevalence of mesial step in mixed dentition was found to be 8.9%, with almost equal distribution of males and females. 6 year old patients had higher prevalence rates of mesial step occlusion among mixed dentition and least prevalence of mesial step malocclusion was seen in the 11 year old patients.

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