

Prevalence of flush terminal plane in mixed dentition

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Abstract: Flush terminal plane is the normal feature of deciduous dentition. This type of terminal plane is where the distal surfaces of upper & lower second deciduous molars are in same vertical plane. It is also known as straight terminal plane. Flush terminal plane is also the most common type of terminal plane. Terminal plane relationship can be used to predict the future interocclusal relation of the erupting first permanent molars. The relationship can greatly influence the position of the first permanent molars, as the eruption path of the first permanent molars is guided by the distal surface of the distal root and tooth crown of the second primary molar. Malocclusion is a common oral disease affecting children with various reported prevalence rates. This meta-analysis aimed to determine the epidemiological characteristics of malocclusion among pre-schoolers in mainland China from 1988 to 2017. A total of 31 qualified papers describing 51,100 Chinese children aged 2–7 years were selected. The prevalence of flush terminal plane was 47.10% (CI: 28.76–65.44%) and it was the most common in the terminal plane relationship. An increasing trend and wide variations across the country were observed. Additionally, there was no significant difference in malocclusion by gender (relative risk (RR) = 1.01, [0.96–1.06]) or urban/rural area (RR = 0.99, [0.82–1.20]). Although this study represents a narrow view of deciduous-dentition malocclusion in South India revention and timely treatment.

INTRODUCTION

Understanding the prevalence of various occlusions in different parts of the world among various populations helps in providing a better dental service. Ethnic, genetic and environmental factors are one of the major contributors of malocclusion variance. Terminal plane is the mesial-distal relation between the distal surface of the upper and lower second primary molars when the primary teeth contact is in centric occlusion. Terminal plane was classified by Baume in 1950 into three types, flush terminal plane, distal terminal plane and mesial terminal plane.

Flush terminal plane is the normal feature of deciduous dentition. This type of terminal plane is where the distal surfaces of upper & lower second deciduous molars are in same vertical plane. It is also known as straight terminal plane. Flush terminal plane is also the most common type of terminal plane. Terminal plane relationship can be used to predict the future interocclusal relation of the erupting first permanent molars. The relationship can greatly influence the position of the first permanent molars, as the eruption path of the first permanent molars is guided by the distal surface of the distal root and tooth crown of the second primary molar.

According to a study done by Lu Shen, Fang He, Cai Zhang, Haofeng Jiang & Jinhua Wang, the most common terminal plane is flush terminal plane (47.10%). Similar study was done in India which also showed that flush terminal plane had the highest prevalence of 66% population. An ideal primary dentition is an indicator of potentially perfect permanent dentition. Maintenance of primary dentition includes conserving the oral health and maintenance of the occlusion for the permanent dentition. Most cases of flush terminal plane developed into Angle Class I in the permanent dentition.

According to research by Miotti, 1991, discrepancies in occlusion, impairment of voluntary movement, and abnormalities in tooth number require earlier intervention. It would be advisable to perform interceptive orthodontic treatment by early intervention. This will help prevent the progression to the full form of a given disorder and excluding factors interfering with the regular development of the dental arches. However and early intervention also means long treatment period with diminishing compliance and uncertain growth prediction.

Thus, an early diagnosis of developing malocclusion links to better treatment approach.

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 flush terminal plane 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 flush terminal plane 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

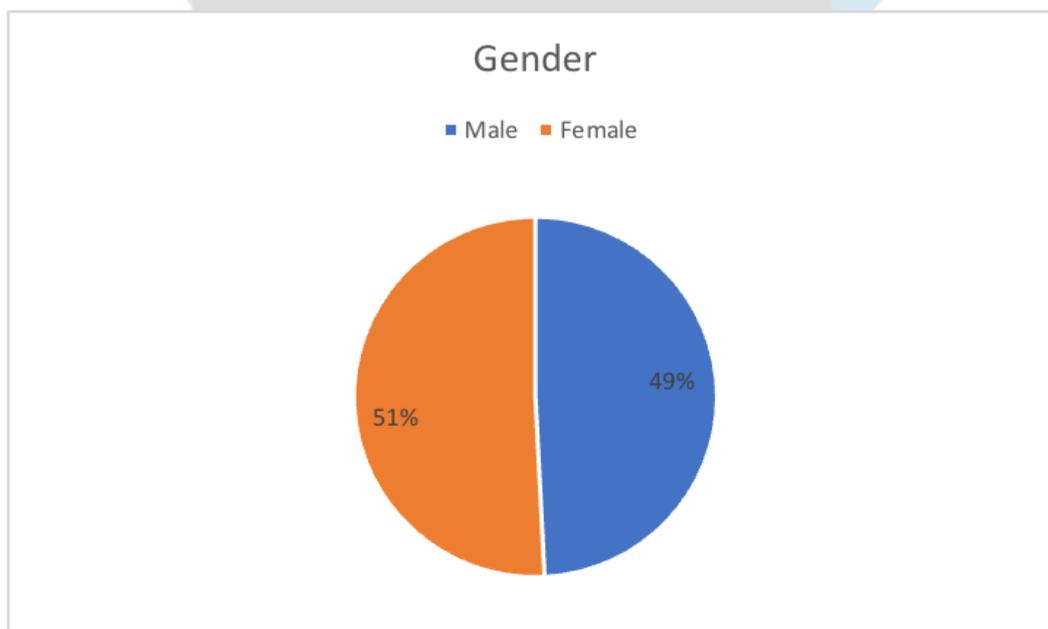


Figure 1 showed the gender distribution of this study

Approximately 23,772 children exhibited malocclusion, with a pooled prevalence of 45.50% (95% confidence interval (CI): 38.08–52.81%). Eleven articles described the prevalence of Class I, Class II and Class III malocclusion. Based on the combined results, the highest prevalence of malocclusion in India pre-schoolers was Class I malocclusion at 26.50% (CI: 19.96–33.12%) compared with Class II malocclusion at 7.97% (CI: 6.06–9.87%) and Class III malocclusion at 12.60% (CI: 9.45–15.68%, Table 2). The meta-analysis of malocclusion types based on 14 primary articles revealed the following proportions: deep overbite 33.66% (CI: 27.66–

39.67%), spacing 28.34% (CI: 20.82–35.87%), anterior crossbite 25.29% (CI: 20.01–30.58%), individual malocclusion 13.88% (CI: 4.93–22.83%), early loss of primary teeth 10.46% (CI: 6.72–14.19%), deep overjet 10.16% (CI: 4.19–16.12%), hypodontia 8.68% (CI: 3.17–14.19%), crowding 8.03% (CI: 4.93–11.13%), anterior edge-to-edge 7.84% (CI: 5.82–9.87%), openbite 3.36% (CI: 2.24–4.48%), posterior crossbite 2.81% (CI: 1.8–4.53%), and posterior scissor bite 2.31% (CI: 1.02–3.60%, Table 2).

Eight articles reported the terminal plane relationship of the second primary molars in India. The pooled results revealed that the most common terminal plane relationship from ages 2 to 7 was the flush terminal plane at 47.10% (CI: 28.76–65.44%), followed by the mesial step at 43.24% (CI: 24.85–61.63%), distal step at 5.04% (CI: 3.29–6.79%), and bilateral symmetry at 5.03% (CI: 3.06–6.99%, Table 2).

The year of study publication varied from 1988 to 2017. Following the methods of previous reviews^{16,17}, we divided the articles into the following 5 periods: ≤1999, 2000–2004, 2005–2009, 2010–2014 and ≥2015. The overall prevalence of malocclusion in children during these periods were 44.98% (CI: 30.35–59.60%), 26.12% (CI: 4.33–47.91%), 35.86% (CI: 27.73–43.99%), 43.89% (CI: 34.56–53.21%) and 70.75% (CI: 64.07–77.43%), respectively (Table 2). This finding clearly demonstrates a substantial increasing trend in deciduous-dentition malocclusion over time (Fig. 2).

The available data from 30 articles was combined, encompassing 14 provinces, 2 autonomous regions, and 1 municipality in India. There were statically significant variations in the prevalence of malocclusion across provinces (Supplementary Table S4). The highest prevalence rates were in Delhi at 57.32% (CI: 32.52–82.12%), Andhra at 71.64% (CI: 69.72–73.57%) and Assam at 63.31% (CI: 55.34–71.28%). The areas of lowest prevalence appeared to be in South Tamilnadu at 13.15% (CI: 11.34–14.96%), North Tamilnadu at 20.50% (CI: 17.89–23.10%) and Telagana at 20.66% (CI: 18.15–23.17%), as indicated by light red on the map in Fig. 3. Seventeen articles reported the prevalence of malocclusion among 14,034 males and 12,703 females aged 2–7 years in India. The prevalence of malocclusion in primary dentition in males and females was 48.84% (CI: 37.01–60.67%) and 49.55% (CI: 37.57–61.53%), respectively (Table 2). Figure 4 demonstrates that there was no significant difference (relative risk (RR) = 1.01, [0.96–1.06]) in malocclusion prevalence by gender.

CONCLUSION

To conclude, the prevalence of flush terminal plane in mixed dentition was found to be 49.10%, with almost equal distribution of males and females. 6 year old patients had higher prevalence rates of flush terminal plane occlusion among mixed dentition and least prevalence of distal step malocclusion was seen in the 7 year old patients.

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MATERIALS AND METHOD:

1. Study population: patients age 6-14 visiting SDC
2. Data to be searched & collected from DIAS
3. Statistics: calculation of the incidence of flush terminal plane in sample population

MATERIALS AND METHOD:

PARA-I

- Study setting: online setting, DIAS records- Saveetha Dental College
- Approval: Patient informed consent, SRB approval
- Sample size: 189 (Anderson, Arnett A. "The Dentition and Occlusal Development in Children of African American Descent." *The Angle Orthodontist*, vol. 77, no. 3, 2007.)
- Age group: 6-14 years
- Cross verification- Photographs- every appointment
- Number of case sheets reviewed- all case sheets for the past one year
- Measures taken to minimise sampling bias - cross verified by the guide
- Internal validity : intra & inter examiner reliability test
- External validity : Cannot be validated externally

PARA-II

- Data collection - DIAS
- Data collection duration- from- March 2019- March 2020

Inclusion criteria:

1. Age group 6-14 years
2. OP
3. Molar relationship
4. Type of dentition
5. Systemically healthy
6. Patient with malocclusion
7. Patient reporting for orthodontic correction

Method:

- Patients- appointment photographs- verified
- Excel tabulation- OP No, age, sex, molar relation, flush terminal plane
- Flush terminal plane - distal surfaces of upper & lower second deciduous molars are in same vertical plane.
- Incomplete data- excluded

PARA-III

- Statistical analysis: SPSS
- Descriptive analysis- mean - standard deviation - prevalence ratio, chi square test
- Independent variable: age & gender
- Dependent variable : flush terminal plane
- Type of analysis: correlation and association
- Determine- significant incidence- flush terminal plane